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 - 2019

Inter-laboratory Alignment Procedure for Rolling Resistance Measurement for Implementation of the tyre labelling scheme according to Regulation (EC) No 1222/2009

Content

1. Executive Summary

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.

The 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.

The Regulation[1] (EC) No 1222/2009 of the European Parliament and of the Council as amended by Commission Regulation[2] (EU) No 228/2011 and by Commission Regulation[3] (EU) No 1235/2011 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 the Regulation (EC) No 1222/2009 on the fuel efficiency class, the external rolling noise class, and the wet grip class of tyres shall be obtained by applying the harmonised testing methods referred to in Annex I of the 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 Annex IVa to the Regulation (EC) No 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"**, the establishment of reference laboratories is essential.

A Network of Laboratories (including an Expert Group) was created under Regulation (EC) No 1222/2009, composed of volunteer test laboratories (Technical Services, Tyre Manufacturers) to perform inter-laboratory 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 at the worldwide level.

The 'Expert Group on laboratory alignment for the measurement of tyre rolling resistance' has been set up on 3/9/2010. Main activities of the group are dedicated to the creation of an alignment method for laboratories having to measure tyre rolling resistance in accordance with the Regulation (EC) 1222/2009. The group met several times in 2010/2011 for the alignment of reference laboratories for the measurement of tyre rolling resistance under the Regulation, and in 2013/2014 for the first assessment of the stability and validity of the assigned values of the initial alignment according to Annex IVa, point 3 of the Regulation. An Intermediate check was initiated by the expert group and performed in 2015 to further improve the alignment process. This check shown that the system of Reference Laboratories is stable with the 10 participating Labs, illustrating that the evolution of some machines can be compensated (or eliminated) by the other Labs. The main difference for the assigned values is due to the tyre evolution, not the Labs evolutions. In 2016/2017 The re-assessment of the assigned values of the reference laboratories alignment have been performed. In 2018 a new Intermediate check procedure have been performed. the Global results showed a complete stability, since there are no significant changes on C1/C2 and C3 machines. Thus, it was decided that the group can continue using their current equations.

Due to the periodic review of the stability of the Network of Reference Laboratories according to the Regulation, a new round of alignment among the Reference Laboratories was done in 2019. This final report includes the new alignment equations that will be applicable as of **December 2nd, 2019**

A document giving a proposal of guidance on how to handle the process of changing alignment equations, both for Reference and Candidate Laboratories is included in Annex F.

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[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] Official Journal of the European Union L 62/1-16, 9.3.2011: COMMISSION REGULATION (EU) No 228/2011 of 7 March 2011 amending Regulation (EC) No 1222/2009 of the European Parliament and of the Council with regard to the wet grip testing method for C1 tyres

[3] Official Journal of the European Union L 317/17-23, 30.11.2011: COMMISSION REGULATION (EU) No 1235/2011 of 29 November 2011 amending Regulation (EC) No 1222/2009 of the European Parliament and of the Council with regard to the wet grip grading of tyres, the measurement of rolling resistance and the verification procedure

The experience gained during the past years and the three inter-laboratory comparison tests led the group to suggest some amendments to Annex IVa of Regulation (EC) No 1222/2009. (See Annex G)

2. Introduction

The Regulation (EC) No 1222/2009 is setting a labelling classification based upon absolute rolling resistance coefficient (RRC) values. Under Annex I to the Regulation, the rolling resistance (RR) shall be measured according to the UN-ECE Regulation R117 and its subsequent amendments.

According to the experience gained by the European tyre industry from previous Round-Robin tests for tyre rolling resistance, and to the previous rounds of the inter-laboratory alignment procedure for tyre rolling resistance measurement under Regulation (EC) No 1222/2009 performed in 2011 and 2014, the deviations in test results observed could reach 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 the Regulation (EC) 1222/2009.

2.1. Members of the Expert Group

Conveners (revolving):

IDIADA (Spain),
TÜV SÜD (Germany),
UTAC CERAM (France).

Tyre manufacturers:

Apollo Vredestein,
Bridgestone,
Continental,
Goodyear,
Michelin,
Pirelli,
ETRTO (European Association)

Independent Test Laboratories:

IDIADA (Spain),
RDW (Netherlands),
TÜV SÜD Product Service (Germany),
UTAC CERAM (France)

Observers:

NOKIAN (Tyre manufacturer),
ETRMA (European Association),
JASIC (Japan),
VCA (United Kingdom),
Swedish Energy Agency (Sweden)

2.2. Approach for laboratory alignment

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

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

In the first step, a Network of Laboratories for the definition of assigned values was created. According to Annex IVa of Regulation 1222/2009, the last assigned values of each alignment tyre were determined by the Network of

Reference Laboratories in 2015. After two years the network has to assess the stability and validity of the assigned values.

One new member (RDW) has been added to the 2015 group of participants, for C1-C2 (OPS 26 P1) and C3 (OPS 26 P2), to the Network of Laboratories in accordance with the rules described in the "Guideline working document on Reference Laboratories as defined in Commission Regulation (EU) No 1235/2011 of 29 November 2011 amending Regulation (EC) No 1222/2009 of the European Parliament and of the Council with regard to the wet grip grading of tyres, the measurement of rolling resistance and the verification procedure". Two other members have changed their C1-C2 machines (i.e. Continental from M 1300 to M 1320, and Apollo Vredestein from Test Machine 12 to 15). Despite these changes representing more than 20% of periodic turnover for C1-C2 participant machines; it was statistically proven that these modifications do not lead to a significant change in the assigned values.

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

The preparation of the laboratory alignment procedure consisted in the 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 inter-laboratory comparison.

Based on the assigned values the Laboratories in the Network are correlated and aligned versus this "virtual reference laboratory".

In the second step, once the Laboratories Network has been established and the alignment vs. the assigned values has been completed, any Candidate Laboratory can be aligned with any of the Network Laboratories.

2.3. Procedure for Inter-laboratory alignment

The Network of Laboratories was created Sept 3, 2010 by the Committee on the Labelling of Tyres under Regulation (EC) 1222/2009 and has been reactivated in 2013, 2016 and 2018 in order to assess the stability and validity of the assigned values.

2.3.1. Choice of laboratories

According to the rules described in the "Guideline working document on reference laboratories as defined in Commission Regulation (EU) No 1235/2011 of 29 November 2011 amending Regulation (EC) No 1222/2009 of the European Parliament and of the Council with regard to the wet grip grading of tyres, the measurement of rolling resistance and the verification procedure", one new member (RDW) fulfil the conditions to be added to the previous group of participants in 2015 to the Network of Laboratories. In 2019 no member have been added.

The 11 Laboratories participating to the Inter laboratory alignment process are identified as follow:

Laboratory Name	Laboratory ID
TÜV SÜD	Lab0
UTAC	LAB1
IDIADA	LAB2
Michelin	LAB3
JASIC	LAB4
Goodyear	LAB5
Continental	LAB6
Bridgestone	LAB7
Pirelli	LAB8
RDW	LAB9
Vredestein	LAB10

Description and information of the machines to be used for the inter-laboratory alignment are given in Annex A.

2.3.2.Choice of alignment tyres

Five sets of alignment tyres for C1/C2 category (A to E) and five sets of alignment tyres for C3 category (F to K) 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.

The pre-tests results shown that the measured Cr values of the C3 tyre set during the pre-tests comply with the expected values for both Cr and Forces.

The alignment tests shown that the assigned value for Cr of tyres D and E in the C1-C2 category was not in line with the targeted values and do not comply with the requirement set out in Annex IVa paragraph 2.2. (a). (i) of the Regulation (EC) No 1222/2009. This non-compliance was confirmed even with the use of aligned data.

The group decided to add one extra tyre with a coefficient of rolling resistance centred between 8.7 N/kN and 10.5 N/kN at 9.1 N/kN for C1-C2 batch. The justification to add a 6th tyre is to improve the RRC range in order to:

- Comply with the requirement set out in Annex IVa paragraph 2.2. (a). (i) of the Regulation (EC) No 1222/2009

- Better represent the operating range of the reference machines regarding the distribution of measuring values

These new batches of 11 tyres X were selected by Continental and pre-tested by Continental, according to the rules described in this chapter.

Final selection of alignment tyres, aligned RRC and RR force:

C1/C2	Targeted RRC	Targeted RRf (N)	Size	Provided by	Pretested by
A	5,9	28	205/55R16	BSEU	PIR
B	7,0	37	225/45R17	BSEU	BSEU
C	8,2	47	245/40ZR18	APO	APO
D	8,7	56	235/55R19	PIR	PIR
X	9,1	82	225/65R16C	CON	CON
E	10,5	79	225/65R17	BSEU	JASIC

C3	Targeted RRC	Targeted RRf (N)	Size	Provided by	Pretested by
F	3,9	146	385/55R22.5	GYR	GYR
G	4,7	107	245/70R17.5	MIC	IDIADA
H	5,3	75	215/75R17.5	CON	RDW
J	5,8	172	295/80R22.5	MIC	UTAC
K	7,4	247	13R22.5	CON	TUEV
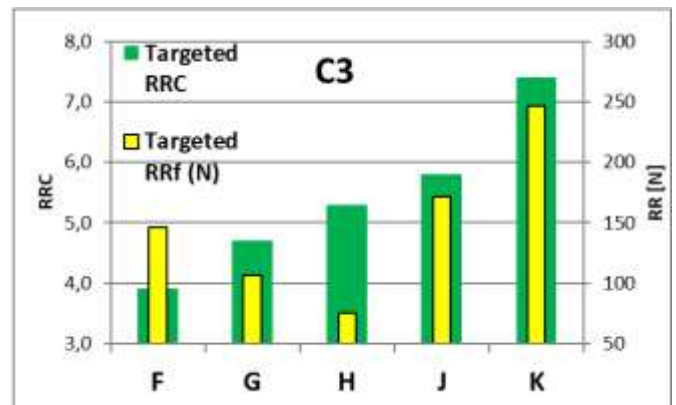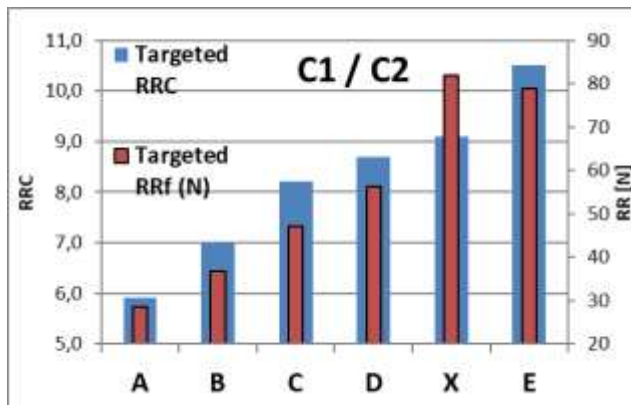
The alignment tyres were provided by industry

Test conditions:

	Brand / Size / Design	LI	SS	Speed [km/h]	Test Load [N]	Infl. press.	Rim ["]	Warm-up	RRC	RR (N)
A	BS 205/55R16 91H	91	H	80	4 827	210	6,50	30	**5,9**	28,5
B	BS 225/45R17 94V XL	94	V	80	5 258	250	7,50	30	**7,0**	36,8
C	APO 245/40ZR18 97Y	97	Y	80	5 729	250	8,50	30	**8,2**	47,0
D	PIR 235/55R19 101V	101	V	80	6 475	210	7,50	30	**8,7**	56,3
X	CON 225/65R16C 112R	112	R	80	9 340	375	6,50	50	**9,1**	82,0
E	BS 225/65R17 102Q	102	Q	80	7 505	200	6,50	30	**10,5**	79,0
F	GYR 385/55R22.5 FUELMAX T	160	K	80	37 523	900	11,75	180	**3,9**	146,3
G	MIC 245/70R17.5 X LINE ENERGY T	143	J	60	22 722	875	7,50	150	**4,7**	106,8
H	CON 215/75R17.5 Hybrid LS3	126	M	80	14 175	700	6,00	150	**5,3**	75,1
J	MIC 295/80R22.5 X MULTIWAY 3D XZE	152	M	80	29 602	850	9,00	180	**5,8**	171,7
K	CON 13R22.5 HDC1	156	K	80	33 354	875	9,00	180	**7,4**	246,8

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 (4 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).

C1 / C2 Tyre ID	Supplier	Pre-tests at	Size	Design
A	Bridgestone	Pirelli	205/55R16 91H	Turanza T001 Eco
B	Bridgestone	Bridgestone	225/45R17 94V	Turanza T005
C	Vredestein	Vredestein	245/40ZR18 97Y	Ultra Satin
D	Pirelli	Pirelli	235/55R19 101V	Scorpion Verde
X	Continental	Continental	225/65R16C 112R	VancoFourSeason 2
E	Bridgestone	JASIC	225/65R17 102Q	Blizzak DM V2

C3 Tyre ID	Supplier	Pre-test at	Size	Design
F	Goodyear	Goodyear	385/55R22.5 160K	FUELMAX T
G	Michelin	IDIADA	245/70R17.5 143/141J	X LINE ENERGY T
H	Continental	IDIADA	215/75R17.5 126M	Hybrid LS3
J	Michelin	UTAC	295/80R22.5 152/148M	X Multiway 3D XZE
K	Continental	TUEV	295/80R22.5 156K	HDC1

2.3.4. Alignment tests for C1-C2 tyres

Each sample of each set of 13 C1-C2 tyres ID A, B, C, D, E and 14 C1-C2 tyres ID X has been tested 4 times on one of the 11 machines dedicated to this class of tyres

2.3.5. Alignment tests for C3 tyres

Each sample of each set of 12 C3 tyres has been tested 4 times on one of the 10 machines dedicated to this class of tyres

3. Results

The analysis of the results of the pre-tests 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 are included in Annex IVa of Regulation (EC) No 1222/2009:

- 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 (A1l, B1l, A2c and B2c) will be rounded and displayed with 4 digits after comma.

Deliverables of the Network of Reference Laboratories Expert Group:

➢ For pre-tests:

- Raw data and aligned data
- Qualification of the data
- Precision and uncertainty values
- Correction factor for each batch
- Conclusions

➢ For alignment tests:

- Raw data and aligned data
- Qualification of the data
- Precision and uncertainty values
- Assigned values
- Qualification of the assigned value
- Alignment equations for reference laboratories
- Precision and uncertainty of predicted values

3.1.Pre-tests results

Each tyre of one batch has been tested on one machine four times and the average and the standard deviation of the three last measurements has been calculated.

The pre-tests batches include at least one additional tyre for each batch and the group decide to choose the alignment tyres to be use in each batch by considering the following criteria appropriate and effective:

Excludes any tyre that has got a standard deviation above the limit (5.0 %) for the three last measurements (Raw values), then in case all the tyres respect the standard deviation condition (Raw values), then remove any tyre who do not make the tyre batch distributed evenly.

The analysis, based on the three last measurements (out of four) for each tyre, results in exclusion of the following samples from the batches:

Batch A Tyre N°6 & 7
Batch B Tyre N°2 & 5
Batch C Tyre N°5 & 8
Batch D Tyres N°0 & 4
Batch X Tyres N°1, N°8 & N°12
Batch E Tyres N°0 & 10

Each remaining tyre from the batch has been re-identified as A0, A1… A10 till X0…, X9, X10.

Batch F Tyre N°2 & 12
Batch G Tyre N°1 & 11
Batch H Tyre N°8 & 11
Batch J Tyres N°7, & N°11
Batch K Tyres N°0 & N°6

Each remaining tyre from the batch has been re-identified as F0, F1… F9 till K0…, K8, K9.

Then, the repeatability of the pre-tests 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. The data and the analysis of these data are given in Annex C to this report.

Another outcome from these pre-tests was the maximum variation of the measured RR coefficient for a set of 11 carefully selected tyres:

- For C1-C2 = -1.93%, +2.65%
- For C3 = -1.77%, +0.02%

Even if we could consider that these results are not bad for manufactured products, a correction factor will be used to normalize the values for future computerization of regression function for each machine.

3.2.Alignment tests results

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

Based on the experience gained during the three previous inter-laboratory rounds in 2011, 2015 and in 2017, all individual data have been used for the calculation of the linear regression function for each laboratory.

4. Conclusion

Pre-tests are still needed to monitor the dispersion of each batch of tyres and to 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 or following the Annex to the proposal for a Regulation on the labelling of tyres with respect to fuel efficiency and other essential parameters repealing Regulation (EC) N°1222/2009) the system is robust.

The experience gained confirms 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.

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

Maximum deviation from assigned values before alignment For C1-C2 = 4.86% / -7.21%	Maximum deviation from assigned values after alignment For C1-C2 = -2.32% / +2.88%
Maximum deviation from assigned values before alignment For C3 = -4.94% / 6.02%	Maximum deviation from assigned values after alignment For C3 = -4.50% / +3.62%
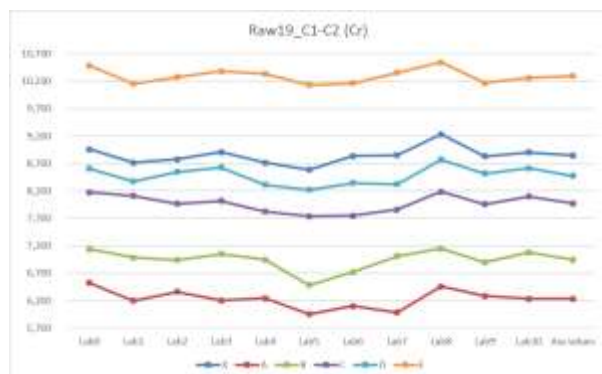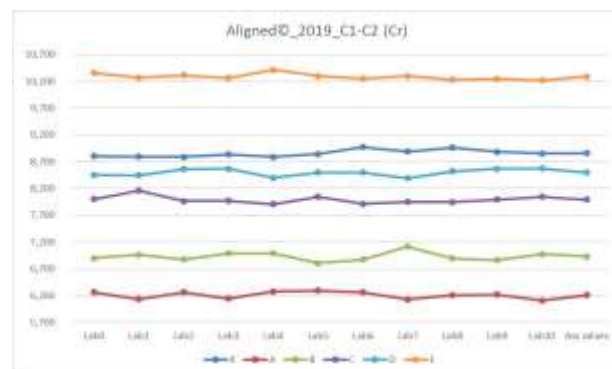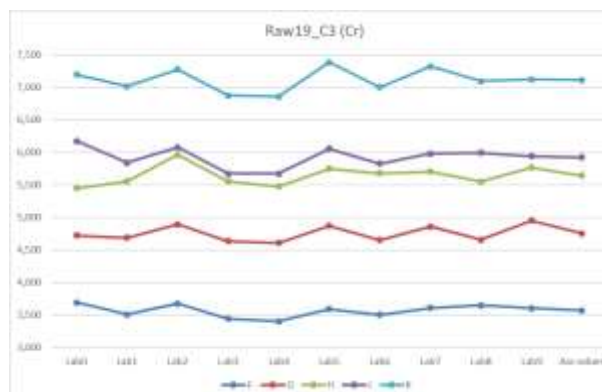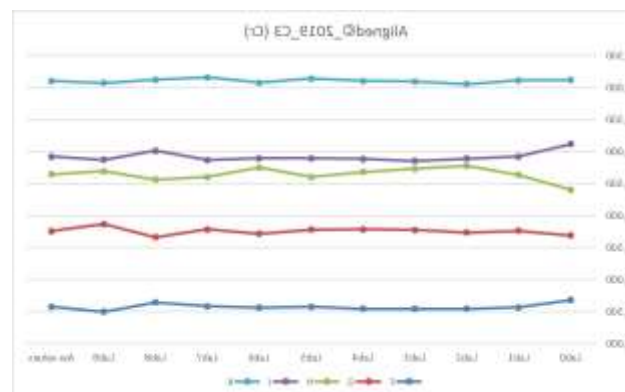
Other documents are annexed to this report:

- Annex E: the template for candidate / reference laboratory alignment.
- Annex F: Proposal of guidance on how to handle the process of changing alignment equations, both for Reference and Candidate laboratories.
- Annex G: Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the labelling of tyres with respect to fuel efficiency and other essential parameters and repealing Regulation (EC) No 1222/2009
- Annex H: ANNEXES to the Proposal for a Regulation of the European Parliament and of the Council on the labelling of tyres with respect to fuel efficiency and other essential parameters and repealing Regulation (EC) No 1222/2009

Annex A – Equipment information

	TUV SÜD N°0		UTAC N°1		IDIADA N°2		Michelin N°3		JASIC N°4		Goodyear N°5		Continental N°6		Bridgestone N°7		Pirelli N°8		RDW N°9		Vredestein N°10	
ADDRESS	TÜV SÜD Product Service GmbH Daimlerstrasse 15 85748 Garching/Munich. Germany		UTAC CERAM Autodrome de Linas-Montlhéry 91319 Montlhéry Cedex France		IDIADA Automotive Technology, S.A. Workshop homologation Division Pol Ind L'Albornar, AP2 exit 12 E-43710 SANTA OLIVA		CERL, Michelin - Magasin F43 Compte J. HERVIOU Zone Industrielle de Ladoux 63118 Cébazat France		Bridgestone Corporation Technical centre 3-1-1, Ogawahigashi-cho, Kodaira-shi, Tokyo 187-8531 Japan		Goodyear Innovation Center Luxembourg Avenue Gordon Smith L-7750 Colmar-Berg Luxembourg		Continental Reifen Deutschland GmbH Jaedekamp 30 30419 Hannover		Bridgestone Europe NV/SA - Italian Branch Via del Fosso del Salceto 13/15, 00128 Roma ITALY		Pirelli Tyre SpA Sperimentazione Indoor via Chiese; 51 20126 Milano ITALY		RDW Testcentrum Talingweg 76 8218 NX Lelystad The Netherlands		Apollo Vredestein B.V. Testdepartment F.a.o. Ralph Greve Ir. E.L.C. Schiffstraat 370 7547 RD Enschede The Netherlands	
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Tel +email	+49 89 32950 -622 or -787 lars.netsch@tuev-sued.de alexander.knoerzer@tuev-sued.de		+33 169804085 marc-antoine.scorianz@utacceram.com elodie.collot@utacceram.com		+34 977166016 ilafuente@idiada.com ricard.anadon@idiada.com		+33 473321125 jeremy.herviou@michelin.com meinhard.boenning@michelin.com		+81 423426331 jun.makino@bridgestone.com kiyoshi.satou@gridgestone.com		+352 81994733 florian_nicolas@goodyear.com		+49 5119764770 rainer.hein@conti.de		+39 06 5056608 riccardo.giovannotti@bridgestone.eu italo.funaro@bridgestone.eu		+39 02 6442 9806 andrea.vergani@pirelli.com		mstuivenvolt@rdw.nl +31 6 319 709 15 dvisser@rdw.nl +31 6 515 822 77		+31 643783269 jos.degier@apollotyres.com	
Tyre type	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3	C1 / C2	C3
Location	Garching - Germany		Linas-Montlhéry - France		Santa-Oliva - Spain		Ladoux - France		Tokyo - Japan		Colmar-Berg - Luxembourg		Hannover - Germany		Rome - Italy		Milan - Italy	Izmit - Turkey	Lelystad - The Netherlands		Enschede - The Netherlands	
Machine identification #	H8	H4	BAN0226-VL	BAN0226-PL	10223	10259	1P/V V2	RRPL A1	RD	RE	M/C # 4	M/C # 5	M1320	M1100	T34001	HU-2	MIQ 2075	US2-45127	OPS 26 - P1	OPS 26 - P2	Testmachine 15	–
Machine operational	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	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	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	–
Measurement method	Power	Power	Torque	Torque	Torque	Torque	Deceleration	Deceleration	Force	Force	Torque	Torque	Torque	Torque	Torque	Torque	Torque	Torque	Torque	Torque	Torque	–
Drum diameter [m]	2.0	1.7	2.0	2.0	1.7	1.7	2.706	2.706	2	5	2	1.7	2	2	2	1.7	2	2	2	2	2	–
Drum surface	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth steel	Smooth Steel	Smooth steel	–
Max. test load [kg]	1835	10194	2000	6000	1500	7000	2039	8155	1500	8000	1250	5000	1529	8155	1275	6120	2000	6000	2000	5000	1450	–

Annex B – Data report template

TIRE ROLLING RESISTANCE PRETEST PROTOCOL

Test Lab

General Data

Test Lab/Location:	LAB XX	Report No.	
Test-Rig:		Test Date:	
Drum Ø [m]:	1,70	Drum Surface:	smooth steel
Test Conditions:	ECE-R 117	Test Method:	Torque

Test-Rim

Diameter x Width[´´]:		Material:	

Tire

Tire-ID:		Tire Class (C1, C2, C3):	2
DOT-Nr.:		Brand-/Trade Name:	
Tire Manufacturer:		Reinforced yes/no:	
Size:		Speed Index:	
Nominal Diameter (m):	0,64	Load Index:	123

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]:	
1	80,0	483	26,0	**Remark:**
2	80,0	483	26,2	Average ambient temperature
3	80,0	483	23,0	during whole process
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	0,010	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

Aligned Results acc. EU 1235/2011 (Temperature 25°C, Drum diameter 2.0m)

1	Slope	0,9690	Intercept	0,1144	8,65
2					8,67
3					8,63
4					8,63

Reference Lab Test Protocol Version 1.2, xx. October, 2014

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 is 0.008 for Class C1 tyres, 0.010 for Class C2 and C3 tyres with a load index equal or lower than 121, 0.006 for Class C3 tyres with a load index greater than 121

Annex C - Pre-tests results

1. Pre-tests results & Correction Factors for C1-C2 tyres

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
A00	6,29	6,19	6,23	6,24	0,992	min	-1,93%
A01	6,19	6,19	6,25	6,21	0,996	max	2,65%
A02	6,14	6,13	6,19	6,15	1,005	range	4,58%
A03	6,35	6,29	6,29	6,31	0,980		
A04	6,14	6,16	6,25	6,18	1,000		
A05	6,19	6,23	6,20	6,21	0,996		
A06	6,10	6,12	6,08	6,10	1,013		
A07	6,14	6,20	6,16	6,17	1,002		
A08	6,06	6,14	6,12	6,11	1,012		
A09	6,19	6,20	6,19	6,19	0,998		
A10	6,12	6,16	6,14	6,14	1,007		
			Avg. total	6,18			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
B00	7,05	7,03	7,02	7,04	1,007	min	-1,71%
B01	7,15	7,13	7,09	7,12	0,995	max	1,57%
B02	7,19	7,19	7,17	7,12	0,987	range	3,28%
B03	7,02	7,00	7,01	7,01	1,010		
B04	7,20	7,18	7,14	7,19	0,988		
B05	7,14	7,09	7,07	7,11	0,998		
B06	7,11	7,09	7,07	7,10	0,999		
B07	7,03	7,01	7,00	7,02	1,010		
B08	7,04	7,00	6,96	7,02	1,012		
B09	7,15	7,13	7,10	7,14	0,994		
B10	7,11	7,08	7,06	7,09	1,000		
			Avg. total	7,09			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
C00	7,95	7,90	7,91	7,92	1,010	min	-1,19%
C01	7,95	7,91	7,91	7,93	1,009	max	1,69%
C02	8,08	8,05	8,03	8,06	0,993	range	2,88%
C03	7,95	7,97	7,96	7,96	1,004		
C04	8,09	8,08	8,09	8,08	0,989		
C05	7,85	7,90	7,89	7,87	1,015		
C06	7,97	8,01	8,02	7,99	0,999		
C07	7,98	7,96	7,98	7,97	1,003		
C08	7,97	7,93	7,92	7,95	1,007		
C09	8,01	7,98	8,00	7,99	1,000		
C10	8,13	8,09	8,08	8,11	0,987		
			Avg. total	7,99			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
D00	8,59	8,63	8,69	8,61	0,996	min	-1,16%
D01	8,53	8,55	8,52	8,54	1,008	max	0,99%
D02	8,63	8,64	8,64	8,64	0,996	range	2,16%
D03	8,56	8,54	8,50	8,55	1,008		
D04	8,61	8,65	8,64	8,63	0,997		
D05	8,59	8,60	8,58	8,60	1,001		
D06	8,59	8,58	8,58	8,59	1,002		
D07	8,59	8,64	8,59	8,62	1,000		
D08	8,59	8,56	8,55	8,58	1,004		
D09	8,66	8,64	8,66	8,65	0,994		
D10	8,67	8,66	8,63	8,66	0,994		
		Avg. total		8,60			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
E00	10,58	10,63	10,55	10,59	0,991	min	-1,37%
E01	10,35	10,37	10,36	10,36	1,013	max	1,27%
E02	10,37	10,37	10,36	10,37	1,012	range	2,64%
E03	10,57	10,49	10,49	10,52	0,998		
E04	10,60	10,60	10,55	10,60	0,992		
E05	10,57	10,53	10,52	10,55	0,995		
E06	10,57	10,58	10,57	10,57	0,993		
E07	10,60	10,55	10,59	10,58	0,992		
E08	10,43	10,43	10,41	10,43	1,007		
E09	10,46	10,41	10,44	10,44	1,005		
E10	10,46	10,47	10,45	10,46	1,003		
		Avg. total		10,49			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
X00	9,32	9,26	9,22	9,29	0,993	min	-1,44%
X01	9,25	9,22	9,17	9,23	0,999	max	1,29%
X02	9,29	9,24	9,21	9,26	0,995	range	2,74%
X03	9,31	9,24	9,22	9,27	0,994		
X04	9,27	9,24	9,22	9,25	0,995		
X05	9,19	9,19	9,14	9,19	1,003		
X06	9,21	9,13	9,18	9,17	1,003		
X07	9,19	9,12	9,08	9,15	1,008		
X08	9,20	9,11	9,07	9,15	1,008		
X09	9,22	9,19	9,18	9,20	1,001		
X10	9,20	9,21	9,17	9,20	1,001		
		Avg. total		9,20			

2. Pre-tests results & Correction Factors for C3 tyres

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
F00	3,60	3,59	3,60	3,60	1,002	min	-0,97%
F01	3,63	3,61	3,61	3,62	0,997	max	1,25%
F02	3,65	3,63	3,61	3,63	0,993	range	2,22%
F03	3,62	3,59	3,59	3,60	1,001		
F04	3,64	3,61	3,59	3,61	0,998		
F05	3,61	3,61	3,58	3,60	1,001		
F06	3,62	3,61	3,58	3,60	1,000		
F07	3,61	3,59	3,57	3,59	1,004		
F08	3,61	3,61	3,60	3,61	1,000		
F09	3,61	3,60	3,57	3,59	1,003		
	Avg. total			3,57			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
G00	4,84	4,81	4,75	4,80	1,003	min	-1,77%
G01	4,78	4,75	4,73	4,76	1,013	max	1,73%
G02	4,88	4,80	4,84	4,84	0,995	range	3,50%
G03	4,83	4,90	4,79	4,84	0,995		
G04	4,86	4,83	4,78	4,83	0,998		
G05	4,81	4,75	4,80	4,79	1,006		
G06	4,89	4,85	4,82	4,86	0,992		
G07	4,85	4,81	4,83	4,83	0,997		
G08	4,84	4,87	4,86	4,86	0,992		
G09	4,83	4,73	4,77	4,78	1,008		
	Avg. total			4,82			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
H00	5,78	5,78	5,77	5,78	0,994	min	-1,49%
H01	5,71	5,75	5,74	5,74	1,002	max	0,69%
H02	5,73	5,71	5,73	5,73	1,003	range	2,18%
H03	5,71	5,75	5,69	5,73	1,005		
H04	5,77	5,74	5,73	5,71	0,999		
H05	5,74	5,78	5,75	5,75	0,997		
H06	5,72	5,74	5,66	5,76	1,006		
H07	5,75	5,72	5,74	5,74	1,000		
H08	5,77	5,76	5,75	5,76	0,996		
H09	5,76	5,73	5,75	5,75	0,999		
	Avg. total			5,74			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
J00	5,99	5,93	5,92	5,95	1,006	min	-1,00%
J01	6,01	5,96	5,94	5,97	1,002	max	1,27%
J02	6,01	5,98	5,97	5,99	0,999	range	2,18%
J03	6,00	5,98	5,96	5,98	1,000		
J04	6,02	5,97	5,95	5,98	1,000		
J05	6,03	5,98	5,98	5,99	0,998		
J06	6,03	5,98	5,96	5,99	0,998		
J07	6,01	5,95	5,95	5,97	1,002		
J08	6,06	6,03	6,01	6,03	0,992		
J09	6,00	5,95	5,93	5,96	1,003		
		Avg. total		5,98			

Tyre	Test 2	Test 3	Test 4	Avg.	Correction Factor	Average Raw Deviation	
K00	7,41	7,40	7,37	7,39	0,985	min	-1,52%
K01	7,34	7,33	7,31	7,33	0,994	max	1,78%
K02	7,33	7,31	7,36	7,33	0,993	range	3,30%
K03	7,28	7,28	7,34	7,30	0,997		
K04	7,19	7,18	7,19	7,19	1,013		
K05	7,37	7,27	7,25	7,30	0,998		
K06	7,26	7,17	7,18	7,20	1,011		
K07	7,27	7,27	7,20	7,25	1,005		
K08	7,22	7,30	7,26	7,26	1,003		
K09	7,25	7,24	7,28	7,26	1,003		
		Avg. total		7,28			

Annex D - Alignment tests results - Cr (N/kN)

1. Raw data

1.1. C1-C2 tyres

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	A0	6,44	6,54	6,56	6,54	6,547	0,012	0,992	6,491	6,48	6,50	6,48	0,011
Lab1	A1	6,28	6,23	6,18	6,17	6,196	0,032	0,996	6,169	6,20	6,16	6,14	0,032
Lab2	A2	6,31	6,35	6,31	6,25	6,303	0,050	1,005	6,332	6,38	6,34	6,28	0,051
Lab3	A3	6,38	6,32	6,29	6,29	6,300	0,017	0,980	6,176	6,20	6,17	6,17	0,017
Lab4	A4	6,26	6,21	6,25	6,19	6,217	0,031	1,000	6,216	6,21	6,25	6,19	0,031
Lab5	A5	5,96	5,97	5,96	5,92	5,950	0,026	0,996	5,927	5,95	5,94	5,90	0,026
Lab6	A6	5,94	5,97	5,97	6,04	5,993	0,040	1,013	6,072	6,05	6,05	6,12	0,041
Lab7	A7	5,95	5,97	5,92	5,94	5,943	0,025	1,002	5,958	5,98	5,93	5,95	0,025
Lab8	A8	6,39	6,35	6,35	6,35	6,350	0,000	1,012	6,427	6,43	6,43	6,43	0,000
Lab9	A9	6,41	6,25	6,29	6,26	6,267	0,021	0,998	6,256	6,24	6,28	6,25	0,021
Lab10	A10	6,17	6,16	6,16	6,17	6,163	0,006	1,007	6,205	6,20	6,20	6,21	0,006
									6,203				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	B0	7,19	7,09	7,05	7,07	7,070	0,020	1,007	7,120	7,14	7,10	7,12	0,020
Lab1	B1	7,10	7,01	6,98	7,03	7,004	0,025	0,995	6,968	6,97	6,94	6,99	0,025
Lab2	B2	7,06	7,02	7,02	7,00	7,013	0,012	0,987	6,920	6,93	6,93	6,91	0,011
Lab3	B3	6,99	6,98	6,95	6,95	6,960	0,017	1,010	7,032	7,05	7,02	7,02	0,018
Lab4	B4	7,12	7,00	7,03	7,00	7,010	0,017	0,988	6,927	6,92	6,95	6,92	0,017
Lab5	B5	6,52	6,53	6,44	6,46	6,477	0,047	0,998	6,464	6,52	6,43	6,45	0,047
Lab6	B6	6,77	6,74	6,71	6,67	6,707	0,035	0,999	6,702	6,74	6,71	6,67	0,035
Lab7	B7	6,98	6,94	6,92	6,91	6,923	0,015	1,010	6,992	7,01	6,99	6,98	0,015
Lab8	B8	7,13	7,03	7,05	7,05	7,043	0,012	1,012	7,126	7,11	7,13	7,13	0,012
Lab9	B9	7,04	6,96	6,90	6,90	6,920	0,035	0,994	6,881	6,92	6,86	6,86	0,034
Lab10	B10	7,07	7,05	7,05	7,06	7,053	0,006	1,000	7,055	7,05	7,05	7,06	0,006
									6,926				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	C0	8,18	8,13	8,12	8,10	8,117	0,015	1,010	8,194	8,21	8,20	8,18	0,015
Lab1	C1	8,15	8,07	8,05	8,03	8,052	0,022	1,009	8,125	8,15	8,12	8,10	0,022
Lab2	C2	8,07	8,05	8,03	8,05	8,043	0,012	0,993	7,985	7,99	7,97	7,99	0,011
Lab3	C3	8,08	8,00	8,00	8,00	8,000	0,000	1,004	8,036	8,04	8,04	8,04	0,000
Lab4	C4	8,07	7,93	7,95	7,91	7,930	0,020	0,989	7,840	7,84	7,86	7,82	0,020
Lab5	C5	7,72	7,70	7,61	7,61	7,640	0,052	1,015	7,752	7,81	7,72	7,72	0,053
Lab6	C6	7,83	7,75	7,79	7,76	7,767	0,021	0,999	7,762	7,75	7,79	7,76	0,021
Lab7	C7	7,93	7,88	7,86	7,82	7,853	0,031	1,003	7,875	7,90	7,88	7,84	0,031
Lab8	C8	8,22	8,13	8,17	8,13	8,143	0,023	1,007	8,200	8,19	8,23	8,19	0,023
Lab9	C9	8,08	7,94	7,97	8,02	7,977	0,040	1,000	7,975	7,94	7,97	8,02	0,040
Lab10	C10	8,27	8,23	8,22	8,21	8,220	0,010	0,987	8,114	8,12	8,11	8,10	0,010
									7,987				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	D0	8,75	8,70	8,64	8,64	8,660	0,035	0,996	8,626	8,67	8,61	8,61	0,035
Lab1	D1	8,46	8,35	8,31	8,33	8,328	0,017	1,008	8,394	8,41	8,38	8,39	0,018
Lab2	D2	8,64	8,59	8,62	8,59	8,600	0,017	0,996	8,567	8,56	8,59	8,56	0,017
Lab3	D3	8,64	8,59	8,58	8,57	8,580	0,010	1,008	8,648	8,66	8,65	8,64	0,010
Lab4	D4	8,42	8,40	8,32	8,37	8,363	0,040	0,997	8,334	8,37	8,29	8,34	0,040
Lab5	D5	8,31	8,26	8,22	8,20	8,227	0,031	1,001	8,238	8,27	8,23	8,21	0,031
Lab6	D6	8,38	8,33	8,37	8,33	8,343	0,023	1,002	8,361	8,35	8,39	8,35	0,023
Lab7	D7	8,40	8,37	8,34	8,33	8,347	0,021	1,000	8,343	8,37	8,34	8,33	0,021
Lab8	D8	8,80	8,80	8,75	8,71	8,753	0,045	1,004	8,789	8,84	8,79	8,75	0,045
Lab9	D9	8,76	8,62	8,58	8,56	8,587	0,031	0,994	8,537	8,57	8,53	8,51	0,030
Lab10	D10	8,68	8,65	8,66	8,74	8,683	0,049	0,994	8,633	8,60	8,61	8,69	0,049

8,497				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	E0	10,81	10,59	10,57	10,55	10,570	0,020	0,991	10,478	10,50	10,48	10,46	0,020
Lab1	E1	10,09	10,06	10,02	9,98	10,019	0,042	1,013	10,148	10,19	10,15	10,11	0,042
Lab2	E2	10,05	10,13	10,17	10,15	10,150	0,020	1,012	10,274	10,25	10,29	10,27	0,020
Lab3	E3	10,40	10,38	10,39	10,43	10,400	0,026	0,998	10,376	10,36	10,37	10,41	0,026
Lab4	E4	10,44	10,38	10,44	10,44	10,420	0,035	0,992	10,332	10,29	10,35	10,35	0,034
Lab5	E5	10,43	10,23	10,17	10,13	10,177	0,050	0,995	10,130	10,18	10,12	10,08	0,050
Lab6	E6	10,08	10,24	10,23	10,23	10,233	0,006	0,993	10,160	10,17	10,16	10,16	0,006
Lab7	E7	10,49	10,46	10,45	10,41	10,440	0,026	0,992	10,356	10,38	10,37	10,33	0,026
Lab8	E8	10,55	10,46	10,50	10,45	10,470	0,026	1,007	10,539	10,53	10,57	10,52	0,027
Lab9	E9	10,25	10,08	10,14	10,12	10,113	0,031	1,005	10,166	10,13	10,19	10,17	0,031
Lab10	E10	10,28	10,26	10,22	10,20	10,227	0,031	1,003	10,257	10,29	10,25	10,23	0,031
									10,292				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	X0	9,10	9,05	9,04	9,01	9,033	0,021	0,993	8,970	8,99	8,98	8,95	0,021
Lab1	X1	8,82	8,75	8,73	8,73	8,737	0,013	0,999	8,726	8,74	8,72	8,72	0,013
Lab2	X2	8,85	8,84	8,83	8,82	8,830	0,010	0,995	8,787	8,80	8,79	8,78	0,010
Lab3	X3	9,04	8,99	8,97	8,96	8,973	0,015	0,994	8,920	8,94	8,92	8,91	0,015
Lab4	X4	8,80	8,79	8,76	8,74	8,763	0,025	0,995	8,724	8,75	8,72	8,70	0,025
Lab5	X5	8,60	8,61	8,56	8,54	8,570	0,036	1,003	8,597	8,64	8,59	8,57	0,036
Lab6	X6	8,87	8,87	8,80	8,79	8,820	0,044	1,003	8,848	8,90	8,83	8,82	0,044
Lab7	X7	8,84	8,80	8,79	8,79	8,793	0,006	1,008	8,863	8,87	8,86	8,86	0,006
Lab8	X8	9,22	9,16	9,19	9,15	9,167	0,021	1,008	9,243	9,24	9,27	9,23	0,021
Lab9	X9	8,91	8,87	8,80	8,84	8,837	0,035	1,001	8,842	8,88	8,80	8,84	0,035
Lab10	X10	8,96	8,92	8,90	8,89	8,903	0,015	1,001	8,912	8,93	8,91	8,90	0,015
									8,857				

1.2. C3 tyres

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	F0	3,67	3,66	3,70	3,70	3,687	0,023	1,002	3,695	3,67	3,71	3,71	0,023
Lab1	F1	3,55	3,54	3,52	3,50	3,522	0,017	0,997	3,511	3,53	3,51	3,49	0,017
Lab2	F2	3,72	3,70	3,72	3,68	3,700	0,020	0,993	3,675	3,67	3,69	3,65	0,020
Lab3	F3	3,46	3,45	3,44	3,43	3,440	0,010	1,001	3,445	3,45	3,44	3,43	0,010
Lab4	F4	3,44	3,42	3,41	3,40	3,410	0,010	0,998	3,402	3,41	3,40	3,39	0,010
Lab5	F5	3,64	3,60	3,58	3,58	3,587	0,012	1,001	3,592	3,61	3,58	3,58	0,012
Lab6	F6	3,52	3,51	3,50	3,50	3,503	0,006	1,000	3,505	3,51	3,50	3,50	0,006
Lab7	F7	3,63	3,61	3,59	3,58	3,593	0,015	1,004	3,608	3,63	3,61	3,59	0,015
Lab8	F8	3,48	3,64	3,66	3,65	3,650	0,010	1,000	3,648	3,64	3,66	3,65	0,010
Lab9	F9	3,60	3,60	3,60	3,58	3,593	0,012	1,003	3,605	3,61	3,61	3,59	0,012
									3,569				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	G0	4,70	4,71	4,71	4,70	4,707	0,006	1,003	4,722	4,73	4,73	4,72	0,006
Lab1	G1	4,66	4,65	4,62	4,62	4,630	0,019	1,013	4,691	4,71	4,68	4,68	0,019
Lab2	G2	4,94	4,91	4,91	4,94	4,920	0,017	0,995	4,896	4,89	4,89	4,92	0,017
Lab3	G3	4,68	4,66	4,66	4,65	4,657	0,006	0,995	4,634	4,64	4,64	4,63	0,006
Lab4	G4	4,70	4,64	4,61	4,60	4,617	0,021	0,998	4,610	4,63	4,60	4,59	0,021
Lab5	G5	4,89	4,85	4,85	4,83	4,843	0,012	1,006	4,873	4,88	4,88	4,86	0,012
Lab6	G6	4,72	4,70	4,69	4,68	4,690	0,010	0,992	4,654	4,66	4,65	4,64	0,010
Lab7	G7	4,93	4,86	4,89	4,87	4,873	0,015	0,997	4,859	4,85	4,88	4,86	0,015
Lab8	G8	4,73	4,67	4,68	4,74	4,697	0,038	0,992	4,658	4,63	4,64	4,70	0,038
Lab9	G9	5,17	4,96	4,90	4,88	4,913	0,042	1,008	4,953	5,00	4,94	4,92	0,042
									4,755				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	H0	5,49	5,50	5,48	5,47	5,483	0,015	0,994	5,450	5,47	5,45	5,44	0,015
Lab1	H1	5,57	5,57	5,54	5,54	5,547	0,017	1,002	5,555	5,57	5,54	5,55	0,017
Lab2	H2	5,97	5,97	5,93	5,94	5,947	0,021	1,003	5,962	5,99	5,95	5,96	0,021
Lab3	H3	5,58	5,52	5,53	5,54	5,530	0,010	1,005	5,557	5,55	5,56	5,57	0,010
Lab4	H4	5,53	5,50	5,48	5,48	5,487	0,012	0,999	5,480	5,49	5,47	5,47	0,012
Lab5	H5	5,79	5,79	5,76	5,75	5,767	0,021	0,997	5,750	5,77	5,74	5,73	0,021
Lab6	H6	5,68	5,65	5,65	5,64	5,647	0,006	1,006	5,681	5,68	5,68	5,67	0,006
Lab7	H7	5,75	5,73	5,68	5,70	5,703	0,025	1,000	5,706	5,73	5,68	5,70	0,025
Lab8	H8	5,58	5,56	5,57	5,58	5,570	0,010	0,996	5,550	5,54	5,55	5,56	0,010
Lab9	H9	6,03	5,78	5,75	5,79	5,773	0,021	0,999	5,766	5,77	5,74	5,78	0,021
									5,646				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	J0	5,91	6,13	6,16	6,13	6,140	0,017	1,006	6,176	6,17	6,20	6,17	0,017
Lab1	J1	5,87	5,86	5,82	5,81	5,831	0,027	1,002	5,841	5,87	5,83	5,82	0,027
Lab2	J2	6,13	6,10	6,08	6,08	6,087	0,012	0,999	6,080	6,09	6,07	6,07	0,012
Lab3	J3	5,70	5,69	5,67	5,66	5,673	0,015	1,000	5,676	5,69	5,67	5,66	0,015
Lab4	J4	5,71	5,69	5,67	5,66	5,673	0,015	1,000	5,675	5,69	5,67	5,66	0,015
Lab5	J5	6,12	6,09	6,06	6,06	6,070	0,017	0,998	6,058	6,08	6,05	6,05	0,017
Lab6	J6	5,89	5,86	5,83	5,83	5,840	0,017	0,998	5,830	5,85	5,82	5,82	0,017
Lab7	J7	6,01	5,97	5,99	5,96	5,973	0,015	1,002	5,983	5,98	6,00	5,97	0,015
Lab8	J8	5,90	6,06	6,08	5,99	6,043	0,047	0,992	5,995	6,01	6,03	5,94	0,047
Lab9	J9	5,93	5,95	5,91	5,91	5,923	0,023	1,003	5,942	5,97	5,93	5,93	0,023
									5.926				

Measures		1	2	3	4	Moy 2-4	Sig 2-4	Correction Factor	Corrected Average	Corrected individual values 2-4			
										2	3	4	sigma
Lab0	K0	7,42	7,29	7,30	7,33	7,307	0,021	0,985	7,195	7,18	7,19	7,22	0,020
Lab1	K1	7,09	7,07	7,05	7,06	7,060	0,008	0,994	7,015	7,02	7,01	7,01	0,008
Lab2	K2	7,35	7,35	7,32	7,31	7,327	0,021	0,993	7,274	7,30	7,27	7,26	0,021
Lab3	K3	6,92	6,90	6,90	6,89	6,897	0,006	0,997	6,878	6,88	6,88	6,87	0,006
Lab4	K4	6,82	6,78	6,78	6,75	6,770	0,017	1,013	6,858	6,87	6,87	6,84	0,018
Lab5	K5	7,37	7,38	7,43	7,39	7,400	0,026	0,998	7,383	7,36	7,41	7,37	0,026
Lab6	K6	6,96	6,95	6,94	6,90	6,930	0,026	1,011	7,004	7,02	7,01	6,97	0,027
Lab7	K7	7,32	7,31	7,29	7,27	7,290	0,020	1,005	7,324	7,34	7,32	7,30	0,020
Lab8	K8	6,98	7,06	7,09	7,08	7,077	0,015	1,003	7,096	7,08	7,11	7,10	0,015
Lab9	K9	7,30	7,11	7,09	7,10	7,100	0,010	1,003	7,123	7,13	7,11	7,12	0,010
									7,115				

2. Qualification of reference machines

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

Laboratory	Sigma A	Sigma B	Sigma C	Sigma D	Sigma E	Sigma X	Sigma m
Lab0	0,011	0,020	0,015	0,035	0,020	0,021	**0,022**
Lab1	0,032	0,025	0,022	0,018	0,042	0,013	**0,027**
Lab2	0,051	0,011	0,011	0,017	0,020	0,010	**0,025**
Lab3	0,017	0,018	0,000	0,010	0,026	0,015	**0,016**
Lab4	0,031	0,017	0,020	0,040	0,034	0,025	**0,029**
Lab5	0,026	0,047	0,053	0,031	0,050	0,036	**0,042**
Lab6	0,041	0,035	0,021	0,023	0,006	0,044	**0,031**
Lab7	0,025	0,015	0,031	0,021	0,026	0,006	**0,022**
Lab8	0,000	0,012	0,023	0,045	0,027	0,021	**0,025**
Lab9	0,021	0,034	0,040	0,030	0,031	0,035	**0,033**
Lab10	0,006	0,006	0,010	0,049	0,031	0,015	**0,025**

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

Laboratory	Sigma F	Sigma G	Sigma H	Sigma J	Sigma K	Sigma m
Lab0	0,023	0,006	0,015	0,017	0,020	**0,017**
Lab1	0,017	0,019	0,017	0,027	0,008	**0,019**
Lab2	0,020	0,017	0,021	0,012	0,021	**0,018**
Lab3	0,010	0,006	0,010	0,015	0,006	**0,010**
Lab4	0,010	0,021	0,012	0,015	0,018	**0,016**
Lab5	0,012	0,012	0,021	0,017	0,026	**0,018**
Lab6	0,006	0,010	0,006	0,017	0,027	**0,015**
Lab7	0,015	0,015	0,025	0,015	0,020	**0,019**
Lab8	0,010	0,038	0,010	0,047	0,015	**0,028**
Lab9	0,012	0,042	0,021	0,023	0,010	**0,024**

3. Statistical analysis of the Interlaboratories results – Cr (N/kN)

4. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre A

4.1. *Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions*

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	6.521	0.012	0.176	0.023
01	3	6.198	0.032	0.513	0.064
02	3	6.362	0.051	0.799	0.102
03	3	6.204	0.017	0.275	0.034
04	3	6.245	0.031	0.491	0.061
05	3	5.955	0.026	0.445	0.053
06	3	6.101	0.041	0.674	0.082
07	3	5.986	0.025	0.423	0.051
08	3	6.457	0.000	0.000	0.000
09	3	6.285	0.021	0.332	0.042
10	3	6.234	0.006	0.094	0.012

4.2. *Confidence interval of the average per laboratory at the level 95%*

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
6.508	6.534	4.303	6.493
6.162	6.233	4.303	6.119
6.305	6.420	4.303	6.236
6.185	6.224	4.303	6.162
6.210	6.280	4.303	6.169
5.925	5.985	4.303	5.889
6.054	6.147	4.303	5.999
5.957	6.015	4.303	5.923
6.457	6.457	4.303	6.457
6.262	6.309	4.303	6.233
6.227	6.241	4.303	6.219

Confidence_interval_T_up	Demi_amplitude_T
6.550	0.029
6.276	0.079
6.488	0.126
6.247	0.042
6.321	0.076
6.021	0.066
6.203	0.102
6.049	0.063
6.457	0.000
6.337	0.052
6.248	0.015

4.3. Between and within contribution for the factor laboratory

Laboratory	CEi	CDi
00	27.03	1.56
01	0.38	11.95
02	5.47	30.49
03	0.24	3.44
04	0.06	11.13
05	24.63	8.29
06	5.51	20.00
07	19.42	7.59
08	16.34	0.00
09	0.92	5.15
10	0.00	0.40

4.4. Global average, results of precision values and measurement uncertainties

Variable	Cr
Global_average	6.232
Repeatability_standard_deviat	0.028
Limit_of_repeatability	0.078
Repeatability_exp_uncertainty	0.055
Reproducibility_stand_deviat	0.178
Limit_of_reproducibility	0.498
Reproducibility_exp_uncertaint	0.355

4.5. Results of measurement uncertainties in percentage

Variable	Cr
Repe_exp_uncert_percent	0.89
Repro_exp_uncert_percent	5.70

4.6. Part of variation in percent of the laboratories on the total variation

Variable	Cr
Variation_part_labo	97.56

4.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.290	0.168	-0.040	0.619	NON
01	3	-0.034	0.168	-0.364	0.295	NON
02	3	0.130	0.168	-0.199	0.460	NON
03	3	-0.027	0.168	-0.357	0.302	NON
04	3	0.013	0.168	-0.316	0.343	NON
05	3	-0.277	0.168	-0.606	0.053	NON
06	3	-0.131	0.168	-0.460	0.198	NON
07	3	-0.246	0.168	-0.575	0.084	NON
08	3	0.225	0.168	-0.104	0.555	NON
09	3	0.054	0.168	-0.276	0.383	NON
10	3	0.002	0.168	-0.327	0.332	NON

4.8. Box-plot graphics
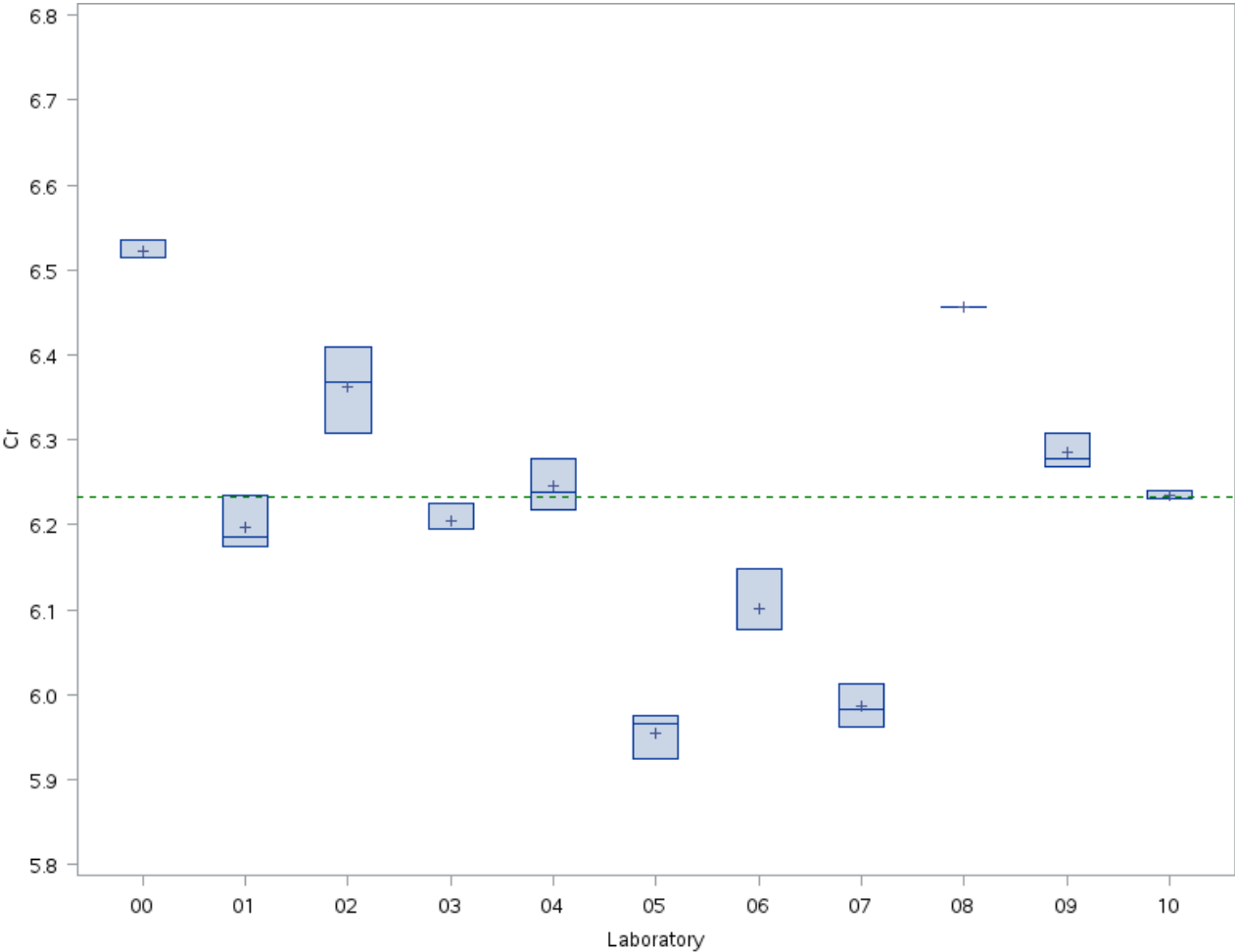
5. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre B

5.1. *Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions*

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	7.141	0.020	0.283	0.040
01	3	6.989	0.025	0.354	0.049
02	3	6.941	0.011	0.165	0.023
03	3	7.053	0.018	0.249	0.035
04	3	6.947	0.017	0.247	0.034
05	3	6.483	0.047	0.730	0.095
06	3	6.722	0.035	0.524	0.070
07	3	7.013	0.015	0.221	0.031
08	3	7.147	0.012	0.164	0.023
09	3	6.901	0.035	0.501	0.069
10	3	7.076	0.006	0.082	0.012

5.2. *Confidence interval of the average per laboratory at the level 95%*

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
7.119	7.164	4.303	7.091
6.961	7.017	4.303	6.927
6.928	6.954	4.303	6.912
7.033	7.073	4.303	7.009
6.927	6.966	4.303	6.904
6.429	6.536	4.303	6.365
6.682	6.762	4.303	6.634
6.995	7.030	4.303	6.974
7.134	7.160	4.303	7.118
6.862	6.940	4.303	6.815
7.069	7.082	4.303	7.061

Confidence_interval_T_up	Demi_amplitude_T
7.192	0.050
7.050	0.061
6.969	0.028
7.097	0.044
6.990	0.043
6.600	0.118
6.809	0.087
7.051	0.038
7.176	0.029
6.987	0.086
7.090	0.014

5.3. Between and within contribution for the factor laboratory

Laboratory	CEi	CDi
00	9.98	5.97
01	0.47	8.94
02	0.01	1.91
03	2.98	4.51
04	0.00	4.31
05	56.62	32.75
06	13.27	18.13
07	1.15	3.50
08	10.59	2.01
09	0.54	17.47
10	4.40	0.49

5.4. Global average, results of precision values and measurement uncertainties

Variable	Cr
Global_average	6.947
Repeatability_standard_deviat	0.025
Limit_of_repeatability	0.070
Repeatability_exp_uncertainty	0.050
Reproducibility_stand_deviat	0.196
Limit_of_reproducibility	0.549
Reproducibility_exp_uncertaint	0.392

5.5. Results of measurement uncertainties in percentage

Variable	Cr
Repe_exp_uncert_percent	0.72
Repro_exp_uncert_percent	5.64

5.6. Part of variation in percent of the laboratories on the total variation

Variable	Cr
Variation_part_labo	98.38

5.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.195	0.186	-0.170	0.559	NON
01	3	0.042	0.186	-0.322	0.406	NON
02	3	-0.006	0.186	-0.370	0.359	NON
03	3	0.106	0.186	-0.258	0.471	NON
04	3	0.000	0.186	-0.364	0.365	NON
05	3	-0.464	0.186	-0.828	-0.100	OUI
06	3	-0.225	0.186	-0.589	0.140	NON
07	3	0.066	0.186	-0.298	0.430	NON
08	3	0.201	0.186	-0.164	0.565	NON
09	3	-0.045	0.186	-0.410	0.319	NON
10	3	0.129	0.186	-0.235	0.494	NON

5.8. Box-plot graphics
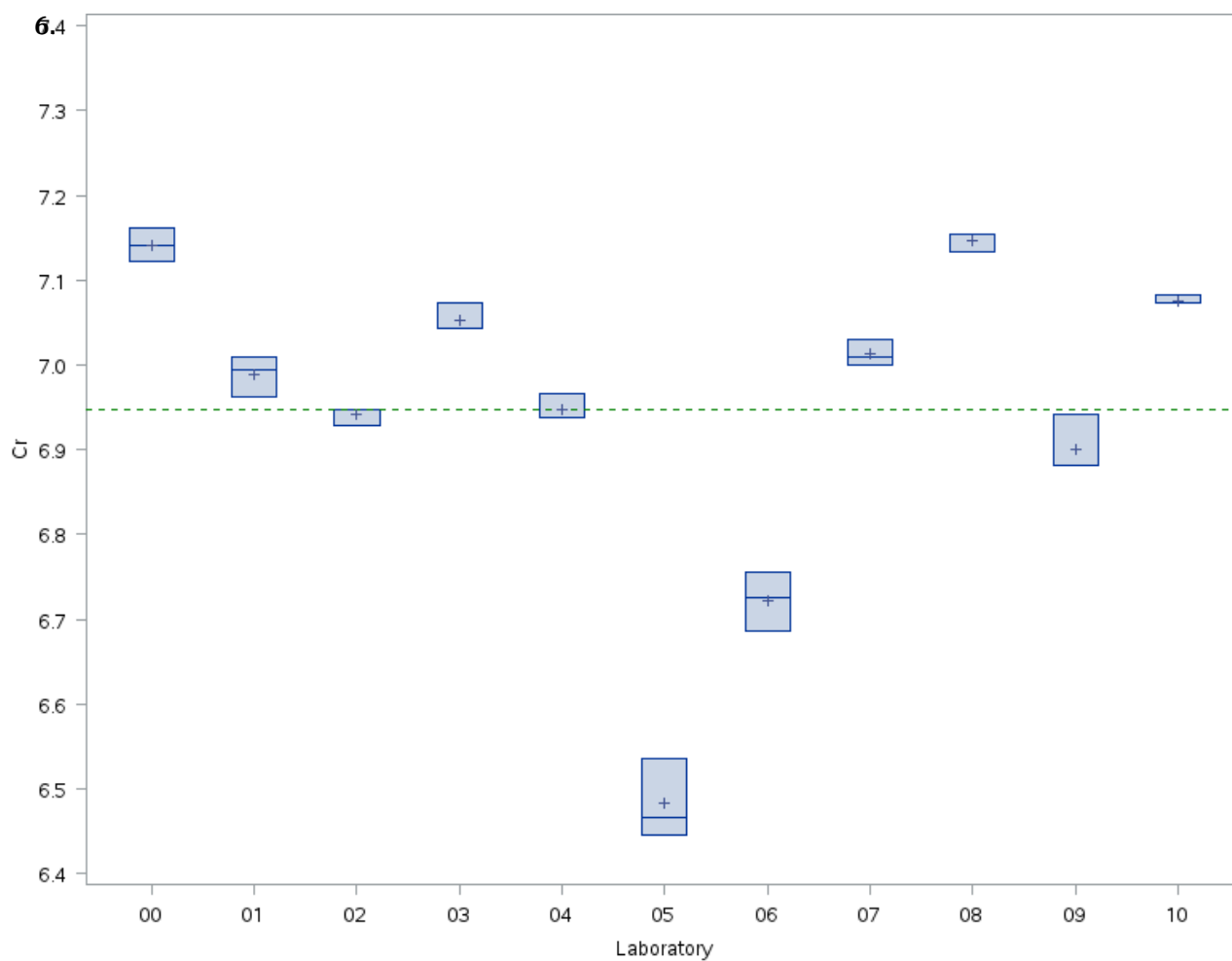
Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre C

6.1. Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	8.178	0.015	0.188	0.031
01	3	8.109	0.022	0.276	0.045
02	3	7.970	0.011	0.144	0.023
03	3	8.020	0.000	0.000	0.000
04	3	7.825	0.020	0.252	0.039
05	3	7.737	0.053	0.680	0.105
06	3	7.747	0.021	0.268	0.042
07	3	7.860	0.031	0.389	0.061
08	3	8.184	0.023	0.284	0.046
09	3	7.960	0.040	0.507	0.081
10	3	8.098	0.010	0.122	0.020

6.2. Confidence interval of the average per laboratory at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
8.161	8.196	4.303	8.140
8.084	8.135	4.303	8.054
7.957	7.983	4.303	7.942
8.020	8.020	4.303	8.020
7.803	7.848	4.303	7.776
7.678	7.797	4.303	7.606
7.724	7.771	4.303	7.696
7.825	7.895	4.303	7.784
8.158	8.211	4.303	8.127
7.914	8.006	4.303	7.860
8.087	8.109	4.303	8.074

Confidence_interval_T_up	Demi_amplitude_T
8.216	0.038
8.165	0.056
7.998	0.028
8.020	0.000
7.874	0.049
7.868	0.131
7.799	0.052
7.936	0.076
8.242	0.058
8.060	0.100
8.123	0.024

6.3. Between and within contribution for the factor laboratory

Laboratory	CEi	CDi
00	16.10	3.09
01	7.14	6.55
02	0.00	1.71
03	0.88	0.00
04	8.11	5.09
05	20.82	36.17
06	19.05	5.63
07	4.73	12.21
08	17.08	7.04
09	0.05	21.25
10	6.03	1.27

6.4. Global average, results of precision values and measurement uncertainties

Variable	Cr
Global_average	7.972
Repeatability_standard_deviat	0.026
Limit_of_repeatability	0.074
Repeatability_exp_uncertainty	0.053
Reproducibility_stand_deviat	0.164
Limit_of_reproducibility	0.459
Reproducibility_exp_uncertaint	0.328

6.5. Results of measurement uncertainties in percentage

Variable	Cr
Repe_exp_uncert_percent	0.66
Repro_exp_uncert_percent	4.12

6.6. Part of variation in percent of the laboratories on the total variation

Variable	Cr
Variation_part_labo	97.42

6.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.206	0.155	-0.098	0.510	NON
01	3	0.137	0.155	-0.167	0.441	NON
02	3	-0.002	0.155	-0.306	0.302	NON
03	3	0.048	0.155	-0.256	0.352	NON
04	3	-0.146	0.155	-0.451	0.158	NON
05	3	-0.235	0.155	-0.539	0.069	NON
06	3	-0.225	0.155	-0.529	0.079	NON
07	3	-0.112	0.155	-0.416	0.192	NON
08	3	0.213	0.155	-0.091	0.517	NON
09	3	-0.012	0.155	-0.316	0.292	NON
10	3	0.126	0.155	-0.178	0.430	NON

6.8. Box-plot graphics
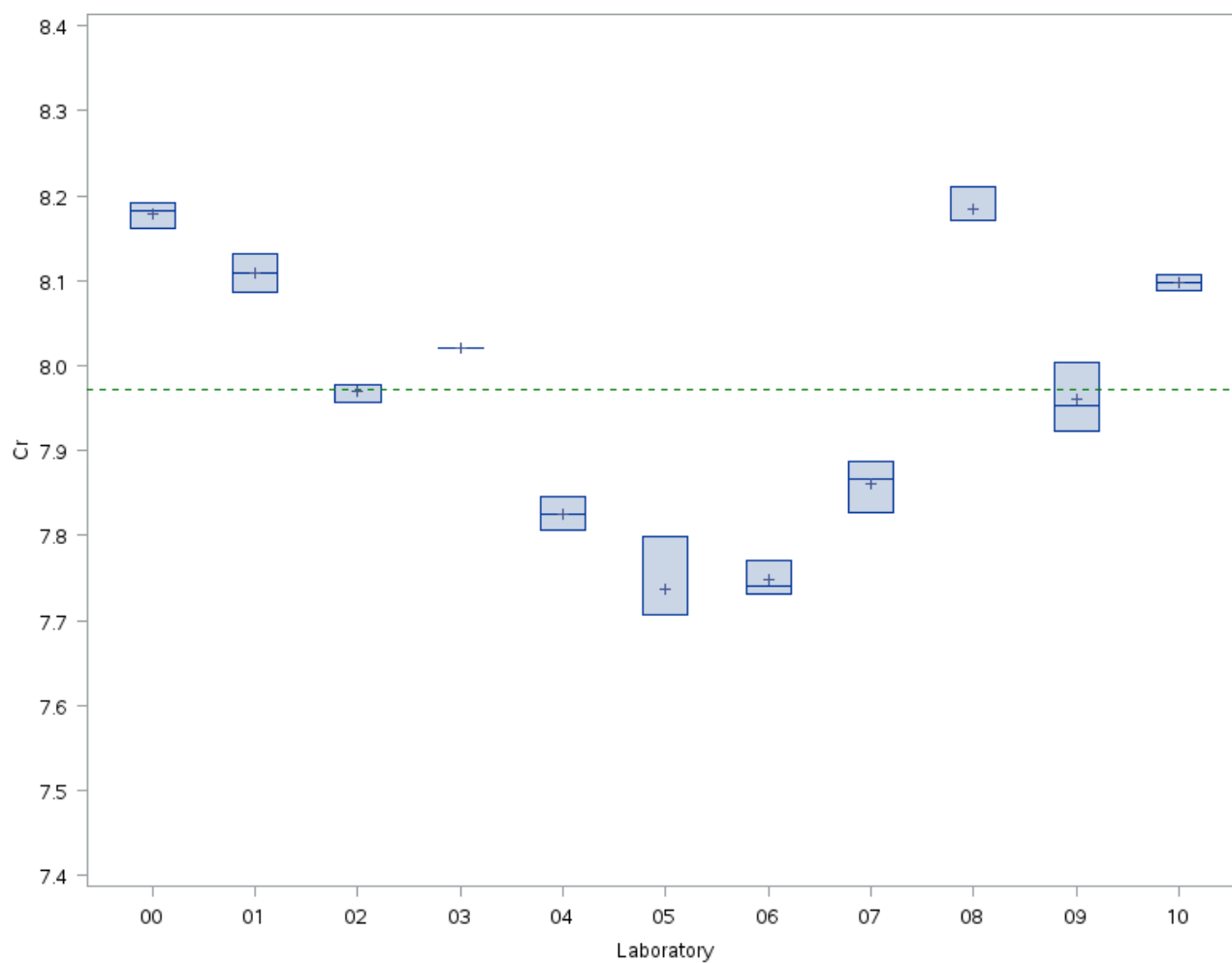
7. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre D

7.1. Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	8.608	0.034	0.400	0.069
01	3	8.375	0.018	0.209	0.035
02	3	8.548	0.017	0.201	0.034
03	3	8.629	0.010	0.117	0.020
04	3	8.316	0.040	0.483	0.080
05	3	8.220	0.031	0.371	0.061
06	3	8.343	0.023	0.277	0.046
07	3	8.325	0.021	0.249	0.042
08	3	8.770	0.045	0.515	0.090
09	3	8.519	0.030	0.356	0.061
10	3	8.615	0.049	0.568	0.098

7.2. Confidence interval of the average per laboratory at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
8.569	8.647	4.303	8.522
8.356	8.395	4.303	8.332
8.529	8.568	4.303	8.505
8.618	8.640	4.303	8.604
8.271	8.362	4.303	8.216
8.186	8.255	4.303	8.145
8.317	8.369	4.303	8.286
8.301	8.348	4.303	8.273
8.719	8.821	4.303	8.658
8.485	8.553	4.303	8.444
8.559	8.670	4.303	8.493

Confidence_interval_T_up	Demi_amplitude_T
8.693	0.086
8.419	0.044
8.591	0.043
8.654	0.025
8.416	0.100
8.296	0.076
8.401	0.057
8.376	0.052
8.882	0.112
8.594	0.075
8.736	0.122

7.3. Between and within contribution for the factor laboratory

Laboratory	CEi	CDi
00	5.63	11.02
01	3.63	2.85
02	1.62	2.76
03	7.64	0.94
04	9.00	15.01
05	22.66	8.66
06	6.24	4.96
07	8.08	4.01
08	28.71	18.98
09	0.54	8.54
10	6.25	22.27

7.4. Global average, results of precision values and measurement uncertainties

Variable	Cr
Global_average	8.479
Repeatability_standard_deviat	0.031
Limit_of_repeatability	0.088
Repeatability_exp_uncertainty	0.063
Reproducibility_stand_deviat	0.174
Limit_of_reproducibility	0.486
Reproducibility_exp_uncertaint	0.347

7.5. Results of measurement uncertainties in percentage

Variable	Cr
Repe_exp_uncert_percent	0.74
Repro_exp_uncert_percent	4.10

7.6. Part of variation in percent of the laboratories on the total variation

Variable	Cr
Variation_part_labo	96.76

7.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.129	0.164	-0.192	0.450	NON
01	3	-0.104	0.164	-0.424	0.217	NON
02	3	0.069	0.164	-0.252	0.390	NON
03	3	0.150	0.164	-0.171	0.471	NON
04	3	-0.163	0.164	-0.484	0.158	NON
05	3	-0.259	0.164	-0.579	0.062	NON
06	3	-0.136	0.164	-0.457	0.185	NON
07	3	-0.154	0.164	-0.475	0.167	NON
08	3	0.291	0.164	-0.030	0.612	NON
09	3	0.040	0.164	-0.281	0.361	NON
10	3	0.136	0.164	-0.185	0.457	NON

7.8. Box-plot graphics
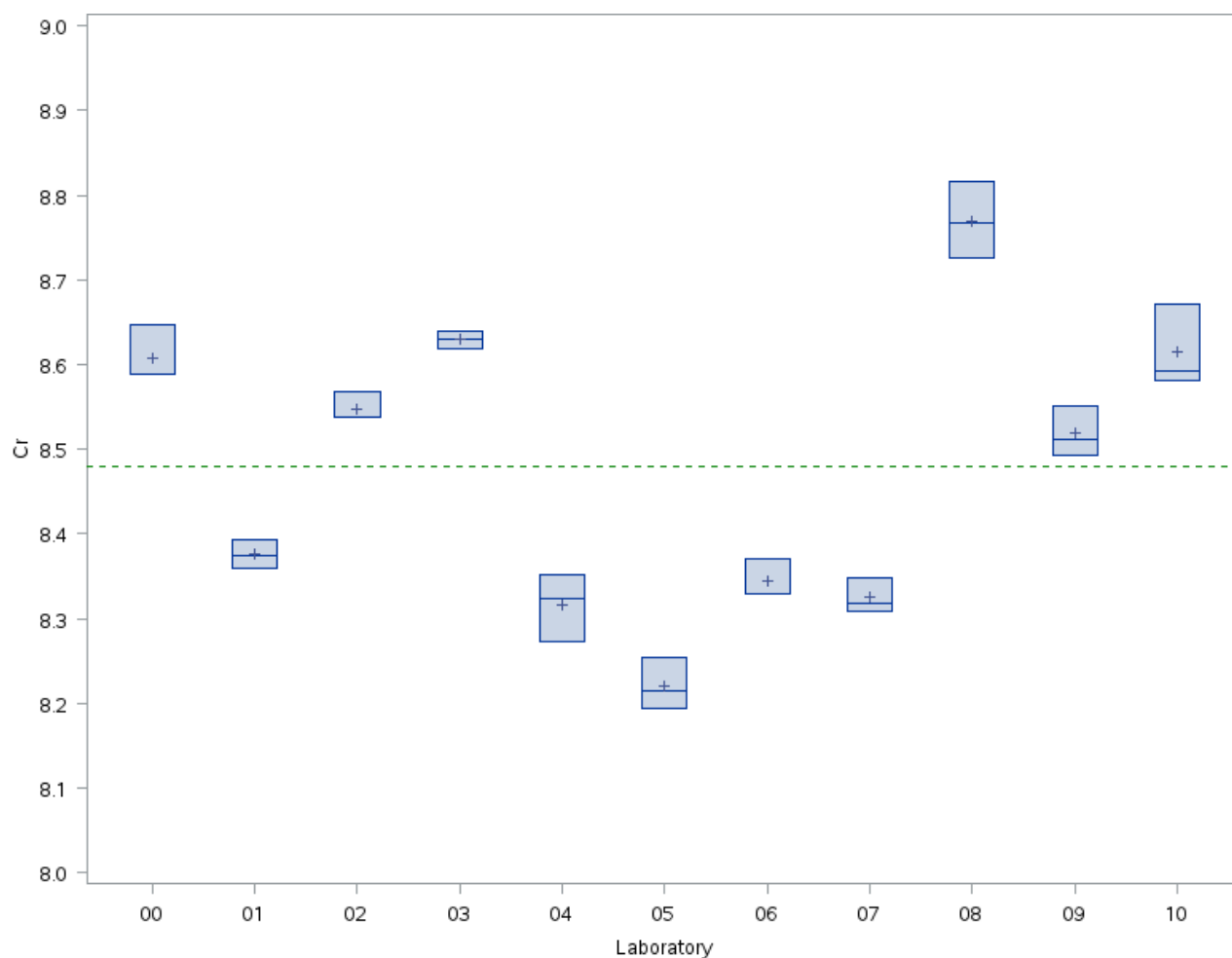
8. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre E

8.1. *Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions*

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	10.483	0.020	0.189	0.040
01	3	10.153	0.042	0.418	0.085
02	3	10.279	0.020	0.197	0.041
03	3	10.381	0.026	0.254	0.053
04	3	10.337	0.034	0.332	0.069
05	3	10.135	0.050	0.495	0.100
06	3	10.165	0.006	0.056	0.011
07	3	10.360	0.026	0.253	0.053
08	3	10.544	0.027	0.253	0.053
09	3	10.171	0.031	0.302	0.061
10	3	10.262	0.031	0.299	0.061

8.2. *Confidence interval of the average per laboratory at the level 95%*

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
10.460	10.505	4.303	10.433
10.105	10.201	4.303	10.047
10.256	10.302	4.303	10.228
10.351	10.411	4.303	10.315
10.298	10.376	4.303	10.252
10.078	10.192	4.303	10.011
10.159	10.172	4.303	10.151
10.331	10.390	4.303	10.295
10.513	10.574	4.303	10.477
10.136	10.206	4.303	10.095
10.227	10.296	4.303	10.185

Confidence_interval_T_up	Demi_amplitude_T
10.532	0.049
10.258	0.106
10.329	0.050
10.447	0.066
10.423	0.085
10.260	0.125
10.179	0.014
10.426	0.065
10.610	0.066
10.247	0.076
10.338	0.076

8.3. Between and within contribution for the factor laboratory

Laboratory	CEi	CDi
00	18.10	3.81
01	10.97	17.50
02	0.18	3.98
03	3.71	6.76
04	0.84	11.45
05	13.85	24.36
06	9.20	0.32
07	2.10	6.68
08	32.00	6.88
09	8.38	9.15
10	0.67	9.11

8.4. Global average, results of precision values and measurement uncertainties

Variable	Cr
Global_average	10.297
Repeatability_standard_deviat	0.031
Limit_of_repeatability	0.086
Repeatability_exp_uncertainty	0.061
Reproducibility_stand_deviat	0.140
Limit_of_reproducibility	0.392
Reproducibility_exp_uncertaint	0.280

8.5. Results of measurement uncertainties in percentage

Variable	Cr
Repe_exp_uncert_percent	0.59
Repro_exp_uncert_percent	2.72

8.6. Part of variation in percent of the laboratories on the total variation

Variable	Cr
Variation_part_labo	95.22

8.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.185	0.131	-0.072	0.443	NON
01	3	-0.144	0.131	-0.402	0.113	NON
02	3	-0.018	0.131	-0.276	0.239	NON
03	3	0.084	0.131	-0.174	0.341	NON
04	3	0.040	0.131	-0.217	0.297	NON
05	3	-0.162	0.131	-0.420	0.095	NON
06	3	-0.132	0.131	-0.390	0.125	NON
07	3	0.063	0.131	-0.194	0.321	NON
08	3	0.246	0.131	-0.011	0.504	NON
09	3	-0.126	0.131	-0.384	0.131	NON
10	3	-0.036	0.131	-0.293	0.222	NON

8.8. Box-plot graphics
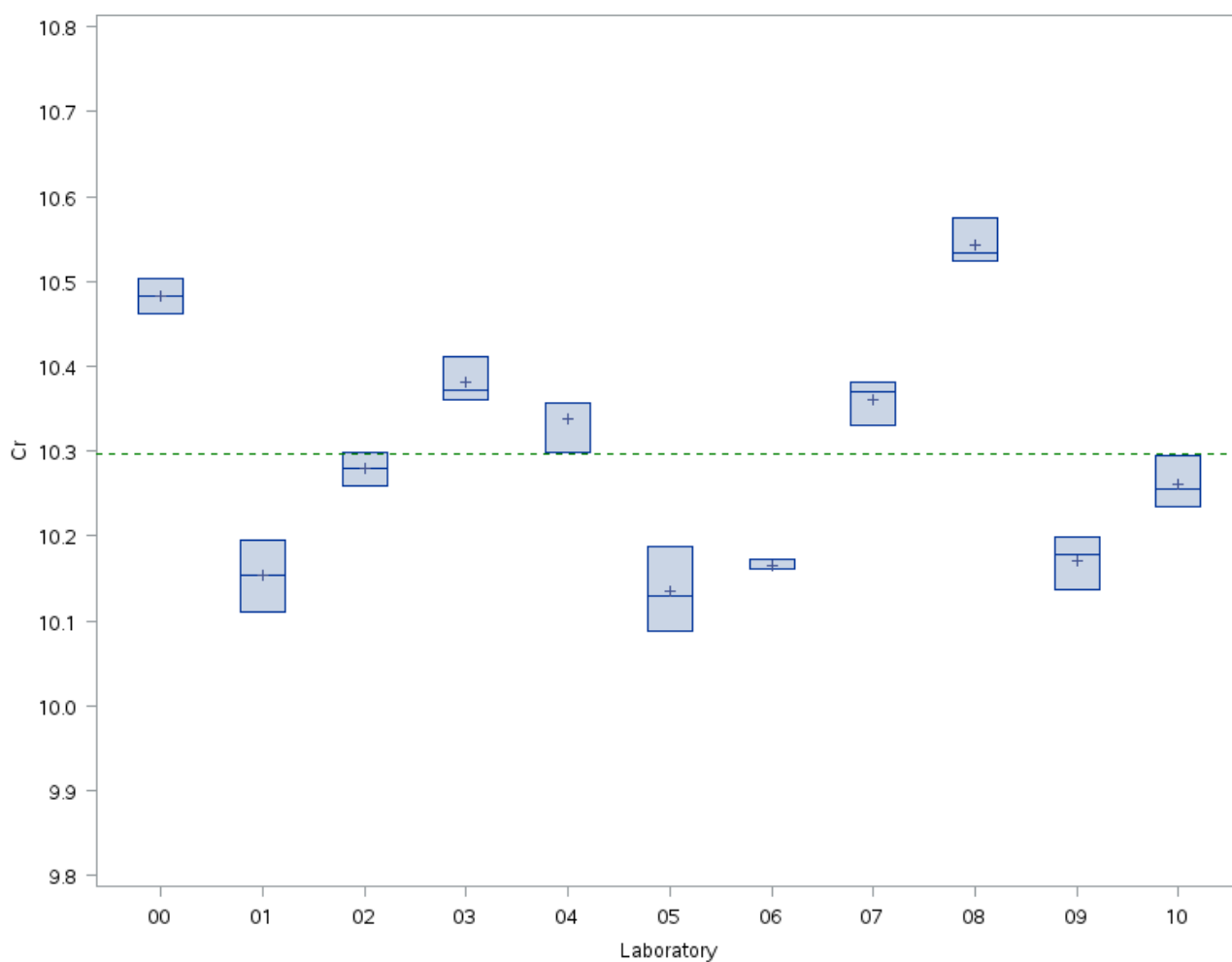
9. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre X

9.1. *Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions*

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	8.959	0.021	0.230	0.041
01	3	8.716	0.013	0.149	0.026
02	3	8.777	0.010	0.113	0.020
03	3	8.909	0.015	0.170	0.030
04	3	8.714	0.025	0.287	0.050
05	3	8.587	0.036	0.421	0.072
06	3	8.837	0.044	0.494	0.087
07	3	8.853	0.006	0.066	0.012
08	3	9.232	0.021	0.227	0.042
09	3	8.831	0.035	0.397	0.070
10	3	8.901	0.015	0.172	0.031

9.2. *Confidence interval of the average per laboratory at the level 95%*

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
8.936	8.983	4.303	8.908
8.701	8.731	4.303	8.684
8.765	8.788	4.303	8.752
8.892	8.927	4.303	8.872
8.685	8.742	4.303	8.651
8.546	8.628	4.303	8.497
8.788	8.887	4.303	8.729
8.846	8.859	4.303	8.838
9.208	9.256	4.303	9.180
8.792	8.871	4.303	8.744
8.884	8.919	4.303	8.863

Confidence_interval_T_up	Demi_amplitude_T
9.011	0.051
8.748	0.032
8.801	0.025
8.947	0.038
8.776	0.062
8.677	0.090
8.946	0.109
8.867	0.014
9.284	0.052
8.919	0.087
8.939	0.038

9.3. Between and within contribution for the factor laboratory

Laboratory	CEi	CDi
00	4.58	6.36
01	6.23	2.51
02	1.79	1.47
03	1.42	3.43
04	6.45	9.35
05	24.54	19.48
06	0.03	28.47
07	0.01	0.50
08	53.78	6.56
09	0.09	18.38
10	1.07	3.48

9.4. Global average, results of precision values and measurement uncertainties

Variable	Cr
Global_average	8.847
Repeatability_standard_deviat	0.025
Limit_of_repeatability	0.069
Repeatability_exp_uncertainty	0.049
Reproducibility_stand_deviat	0.167
Limit_of_reproducibility	0.468
Reproducibility_exp_uncertaint	0.334

9.5. Results of measurement uncertainties in percentage

Variable	Cr
Repe_exp_uncert_percent	0.56
Repro_exp_uncert_percent	3.78

9.6. Part of variation in percent of the laboratories on the total variation

Variable	Cr
Variation_part_labo	97.82

9.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.112	0.158	-0.198	0.423	NON
01	3	-0.131	0.158	-0.441	0.179	NON
02	3	-0.070	0.158	-0.381	0.240	NON
03	3	0.062	0.158	-0.248	0.373	NON
04	3	-0.133	0.158	-0.444	0.177	NON
05	3	-0.260	0.158	-0.570	0.050	NON
06	3	-0.010	0.158	-0.320	0.301	NON
07	3	0.006	0.158	-0.304	0.316	NON
08	3	0.385	0.158	0.075	0.695	OUI
09	3	-0.016	0.158	-0.326	0.295	NON
10	3	0.054	0.158	-0.256	0.365	NON

9.8. Box-plot graphics
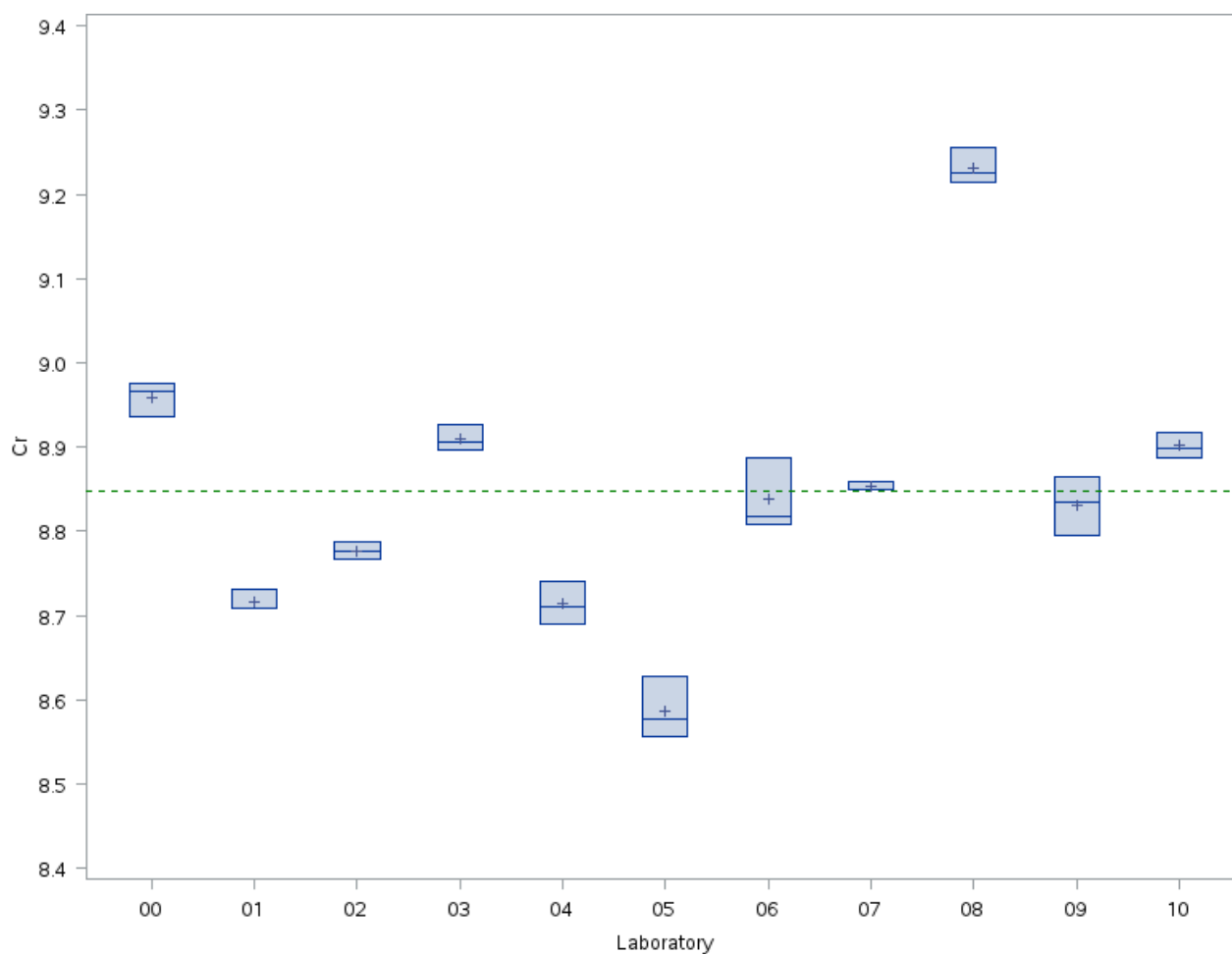
10. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre F

10.1. *Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions*

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	3.691	0.023	0.626	0.046
01	3	3.507	0.017	0.486	0.034
02	3	3.670	0.020	0.541	0.040
03	3	3.441	0.010	0.291	0.020
04	3	3.398	0.010	0.293	0.020
05	3	3.587	0.012	0.322	0.023
06	3	3.501	0.006	0.165	0.012
07	3	3.604	0.015	0.425	0.031
08	3	3.644	0.010	0.274	0.020
09	3	3.601	0.012	0.321	0.023

10.2. *Confidence interval of the average per laboratory at the level 95%*

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
3.665	3.717	4.303	3.633
3.487	3.526	4.303	3.464
3.648	3.693	4.303	3.621
3.429	3.452	4.303	3.416
3.387	3.409	4.303	3.373
3.574	3.601	4.303	3.559
3.494	3.507	4.303	3.487
3.587	3.622	4.303	3.566
3.633	3.655	4.303	3.619
3.588	3.614	4.303	3.572

Confidence_interval_T_up	Demi_amplitude_T
3.748	0.057
3.549	0.042
3.720	0.049
3.466	0.025
3.423	0.025
3.616	0.029
3.515	0.014
3.642	0.038
3.669	0.025
3.630	0.029

10.3.   Between and within contribution for the factor laboratory

Laboratory	CEi	CDi
00	18.33	26.04
01	3.82	14.15
02	12.83	19.17
03	17.52	4.87
04	31.67	4.84
05	0.61	6.50
06	4.63	1.62
07	1.81	11.43
08	7.27	4.85
09	1.52	6.52

10.4.   Global average, results of precision values and measurement uncertainties

Variable	Cr
Global_average	3.564
Repeatability_standard_deviat	0.014
Limit_of_repeatability	0.040
Repeatability_exp_uncertainty	0.029
Reproducibility_stand_deviat	0.099
Limit_of_reproducibility	0.278
Reproducibility_exp_uncertaint	0.198

10.5.   Results of measurement uncertainties in percentage

Variable	Cr
Repe_exp_uncert_percent	0.80
Repro_exp_uncert_percent	5.56

10.6.   Part of variation in percent of the laboratories on the total variation

Variable	Cr
Variation_part_labo	97.91

10.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.126	0.093	-0.057	0.310	NON
01	3	-0.058	0.093	-0.241	0.125	NON
02	3	0.106	0.093	-0.077	0.289	NON
03	3	-0.124	0.093	-0.307	0.059	NON
04	3	-0.166	0.093	-0.349	0.017	NON
05	3	0.023	0.093	-0.160	0.206	NON
06	3	-0.064	0.093	-0.247	0.120	NON
07	3	0.040	0.093	-0.143	0.223	NON
08	3	0.080	0.093	-0.103	0.263	NON
09	3	0.036	0.093	-0.147	0.219	NON

10.8. Box-plot graphics
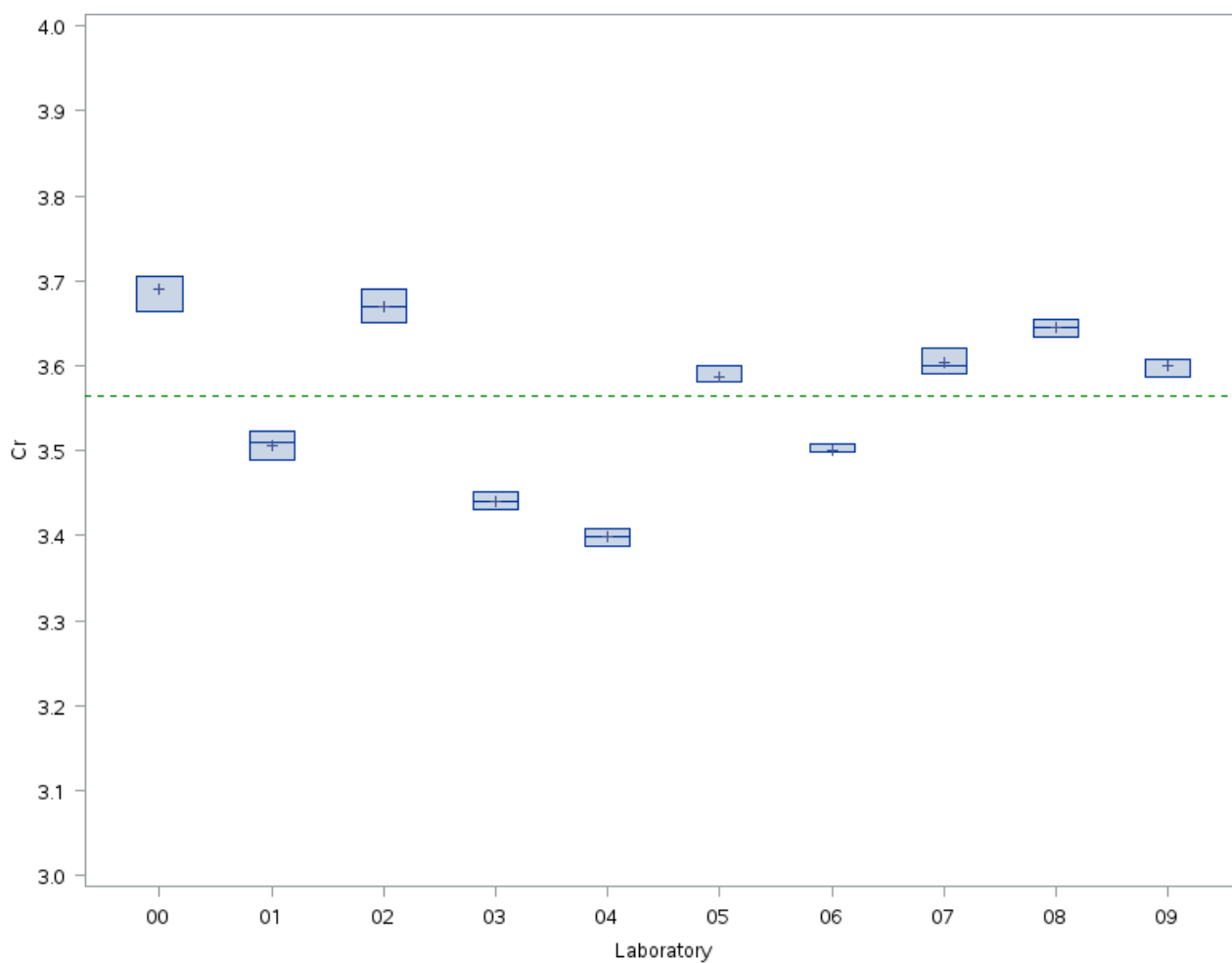
11. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre G

11.1.   Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	4.726	0.006	0.123	0.012
01	3	4.694	0.019	0.414	0.039
02	3	4.899	0.017	0.352	0.034
03	3	4.637	0.006	0.124	0.011
04	3	4.613	0.021	0.451	0.042
05	3	4.876	0.012	0.238	0.023
06	3	4.658	0.010	0.213	0.020
07	3	4.863	0.015	0.313	0.030
08	3	4.661	0.038	0.806	0.075
09	3	4.957	0.042	0.847	0.084

11.2.   Confidence interval of the average per laboratory at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
4.719	4.732	4.303	4.711
4.672	4.716	4.303	4.646
4.880	4.919	4.303	4.856
4.631	4.644	4.303	4.623
4.589	4.637	4.303	4.561
4.863	4.889	4.303	4.847
4.646	4.669	4.303	4.633
4.846	4.880	4.303	4.825
4.618	4.704	4.303	4.568
4.909	5.004	4.303	4.853

Confidence_interval_T_up	Demi_amplitude_T
4.740	0.014
4.742	0.048
4.942	0.043
4.651	0.014
4.665	0.052
4.905	0.029
4.682	0.025
4.901	0.038
4.754	0.093
5.061	0.104

11.3. **Between and within contribution for the factor laboratory**

Laboratory	CEi	CDi
00	0.74	0.70
01	2.86	7.85
02	13.72	6.18
03	10.16	0.69
04	14.59	8.98
05	9.59	2.81
06	7.01	2.05
07	7.53	4.82
08	6.54	29.31
09	27.24	36.63

11.4. **Global average, results of precision values and measurement uncertainties**

Variable	Cr
Global_average	4.758
Repeatability_standard_deviat	0.022
Limit_of_repeatability	0.061
Repeatability_exp_uncertainty	0.044
Reproducibility_stand_deviat	0.128
Limit_of_reproducibility	0.359
Reproducibility_exp_uncertaint	0.256

11.5. **Results of measurement uncertainties in percentage**

Variable	Cr
Repe_exp_uncert_percent	0.92
Repro_exp_uncert_percent	5.38

11.6. **Part of variation in percent of the laboratories on the total variation**

Variable	Cr
Variation_part_labo	97.06

11.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	-0.033	0.120	-0.269	0.203	NON
01	3	-0.064	0.120	-0.300	0.171	NON
02	3	0.141	0.120	-0.095	0.377	NON
03	3	-0.121	0.120	-0.357	0.115	NON
04	3	-0.145	0.120	-0.381	0.090	NON
05	3	0.118	0.120	-0.118	0.354	NON
06	3	-0.101	0.120	-0.337	0.135	NON
07	3	0.104	0.120	-0.131	0.340	NON
08	3	-0.097	0.120	-0.333	0.139	NON
09	3	0.199	0.120	-0.037	0.434	NON

11.8. Box-plot graphics
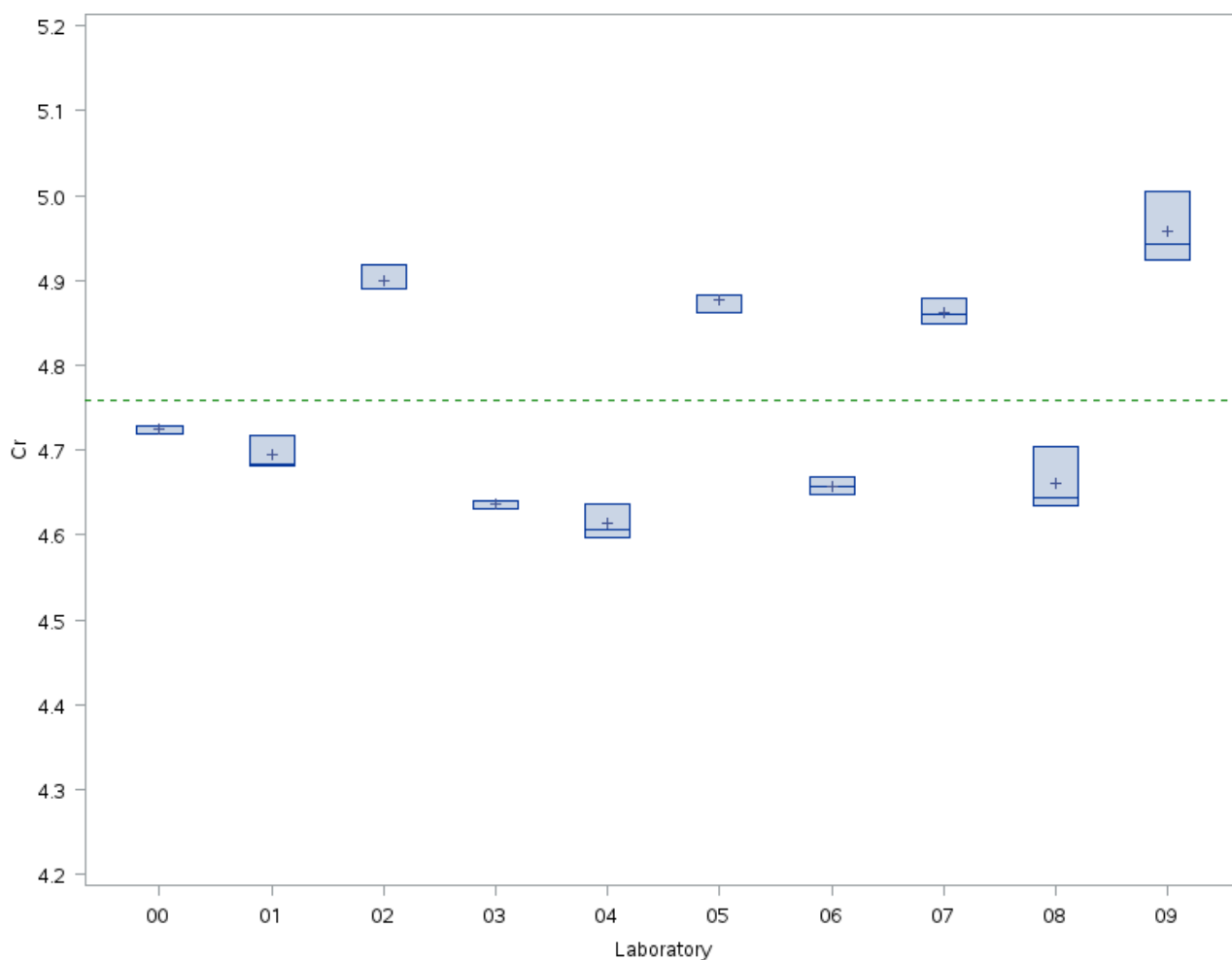
12. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre H

12.1.   Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	5.450	0.015	0.279	0.030
01	3	5.557	0.017	0.300	0.033
02	3	5.964	0.021	0.350	0.042
03	3	5.559	0.010	0.181	0.020
04	3	5.482	0.012	0.210	0.023
05	3	5.752	0.021	0.361	0.042
06	3	5.683	0.006	0.102	0.012
07	3	5.708	0.025	0.441	0.050
08	3	5.552	0.010	0.180	0.020
09	3	5.768	0.021	0.361	0.042

12.2.   Confidence interval of the average per laboratory at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
5.433	5.468	4.303	5.413
5.539	5.576	4.303	5.516
5.941	5.988	4.303	5.913
5.548	5.570	4.303	5.534
5.469	5.495	4.303	5.453
5.728	5.775	4.303	5.700
5.676	5.689	4.303	5.668
5.679	5.736	4.303	5.645
5.541	5.564	4.303	5.528
5.744	5.791	4.303	5.716

Confidence_interval_T_up	Demi_amplitude_T
5.488	0.038
5.599	0.041
6.016	0.052
5.584	0.025
5.510	0.029
5.803	0.052
5.697	0.014
5.770	0.063
5.577	0.025
5.820	0.052

12.3. Between and within contribution for the factor laboratory

Laboratory	CEi	CDi
00	17.49	8.20
01	3.66	9.92
02	45.24	15.51
03	3.53	3.60
04	12.40	4.74
05	4.89	15.34
06	0.56	1.20
07	1.63	22.57
08	4.07	3.54
09	6.53	15.39

12.4. Global average, results of precision values and measurement uncertainties

Variable	Cr
Global_average	5.648
Repeatability_standard_deviat	0.017
Limit_of_repeatability	0.047
Repeatability_exp_uncertainty	0.034
Reproducibility_stand_deviat	0.158
Limit_of_reproducibility	0.441
Reproducibility_exp_uncertaint	0.315

12.5. Results of measurement uncertainties in percentage

Variable	Cr
Repe_exp_uncert_percent	0.59
Repro_exp_uncert_percent	5.58

12.6. Part of variation in percent of the laboratories on the total variation

Variable	Cr
Variation_part_labo	98.87

12.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	-0.197	0.149	-0.489	0.095	NON
01	3	-0.090	0.149	-0.382	0.202	NON
02	3	0.317	0.149	0.025	0.609	OUI
03	3	-0.089	0.149	-0.381	0.204	NON
04	3	-0.166	0.149	-0.458	0.126	NON
05	3	0.104	0.149	-0.188	0.396	NON
06	3	0.035	0.149	-0.257	0.327	NON
07	3	0.060	0.149	-0.232	0.352	NON
08	3	-0.095	0.149	-0.387	0.197	NON
09	3	0.120	0.149	-0.172	0.412	NON

12.8. Box-plot graphics
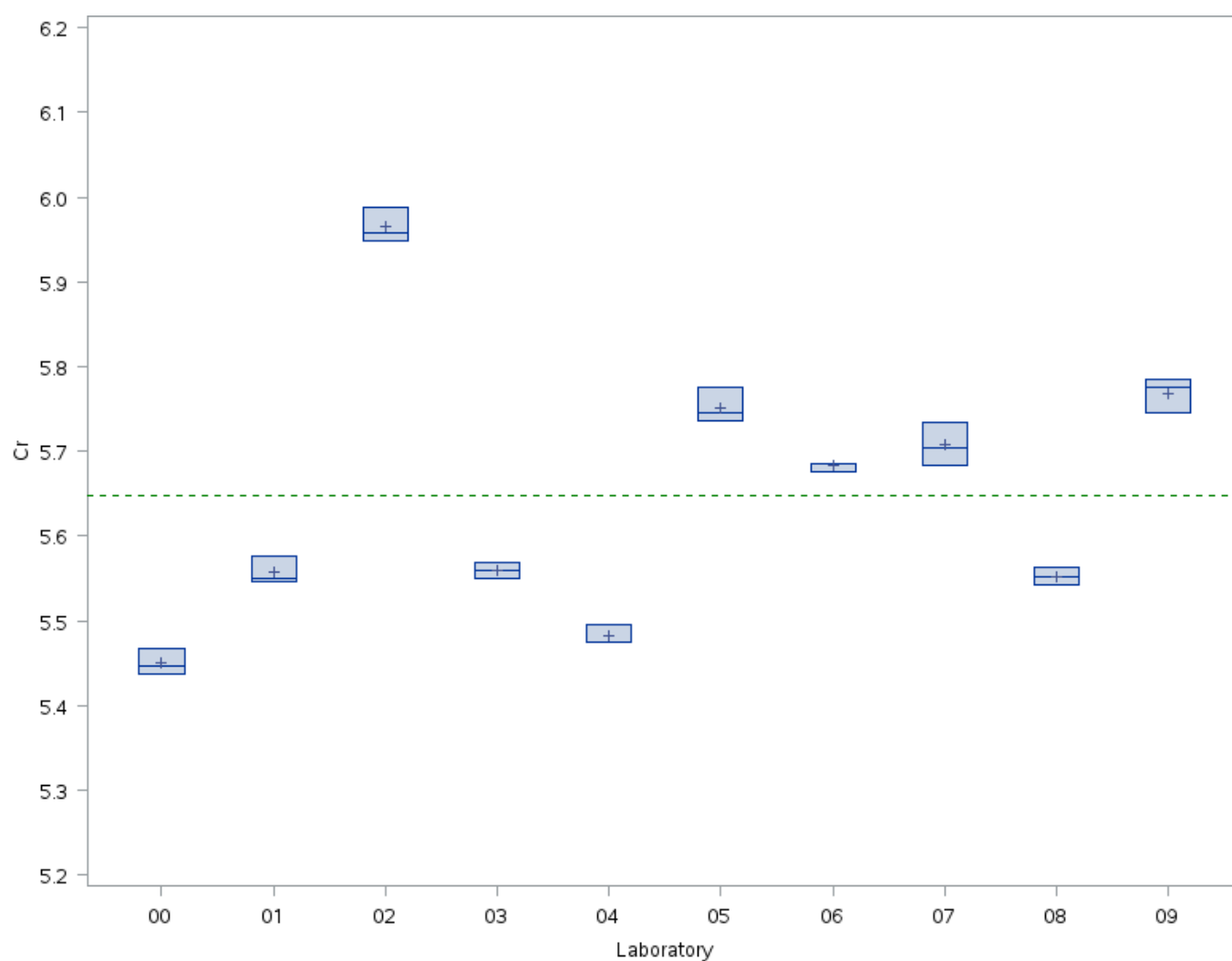
13. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre J

13.1.   Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	6.169	0.017	0.282	0.035
01	3	5.834	0.027	0.467	0.055
02	3	6.073	0.012	0.190	0.023
03	3	5.670	0.015	0.269	0.031
04	3	5.669	0.015	0.269	0.031
05	3	6.051	0.017	0.285	0.035
06	3	5.824	0.017	0.297	0.035
07	3	5.977	0.015	0.256	0.031
08	3	5.988	0.047	0.782	0.094
09	3	5.936	0.023	0.390	0.046

13.2.   Confidence interval of the average per laboratory at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
6.149	6.189	4.303	6.126
5.803	5.865	4.303	5.767
6.060	6.086	4.303	6.044
5.652	5.687	4.303	5.632
5.652	5.686	4.303	5.631
6.031	6.070	4.303	6.008
5.804	5.843	4.303	5.781
5.960	5.994	4.303	5.939
5.935	6.041	4.303	5.872
5.910	5.962	4.303	5.878

Confidence_interval_T_up	Demi_amplitude_T
6.212	0.043
5.902	0.068
6.102	0.029
5.708	0.038
5.707	0.038
6.094	0.043
5.866	0.043
6.015	0.038
6.104	0.116
5.993	0.057

13.3. *Between and within contribution for the factor laboratory*

Laboratory	CEi	CDi
00	24.69	5.82
01	2.84	14.28
02	9.39	2.55
03	24.56	4.48
04	24.74	4.48
05	6.88	5.73
06	3.60	5.73
07	1.32	4.49
08	1.88	42.14
09	0.11	10.30

13.4. *Global average, results of precision values and measurement uncertainties*

Variable	Cr
Global_average	5.919
Repeatability_standard_deviat	0.023
Limit_of_repeatability	0.064
Repeatability_exp_uncertainty	0.046
Reproducibility_stand_deviat	0.169
Limit_of_reproducibility	0.472
Reproducibility_exp_uncertaint	0.337

13.5. *Results of measurement uncertainties in percentage*

Variable	Cr
Repe_exp_uncert_percent	0.77
Repro_exp_uncert_percent	5.70

13.6. *Part of variation in percent of the laboratories on the total variation*

Variable	Cr
Variation_part_labo	98.17

13.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.250	0.159	-0.062	0.562	NON
01	3	-0.085	0.159	-0.397	0.227	NON
02	3	0.154	0.159	-0.158	0.466	NON
03	3	-0.249	0.159	-0.561	0.062	NON
04	3	-0.250	0.159	-0.562	0.062	NON
05	3	0.132	0.159	-0.180	0.444	NON
06	3	-0.095	0.159	-0.407	0.216	NON
07	3	0.058	0.159	-0.254	0.370	NON
08	3	0.069	0.159	-0.243	0.381	NON
09	3	0.017	0.159	-0.295	0.329	NON

13.8. Box-plot graphics
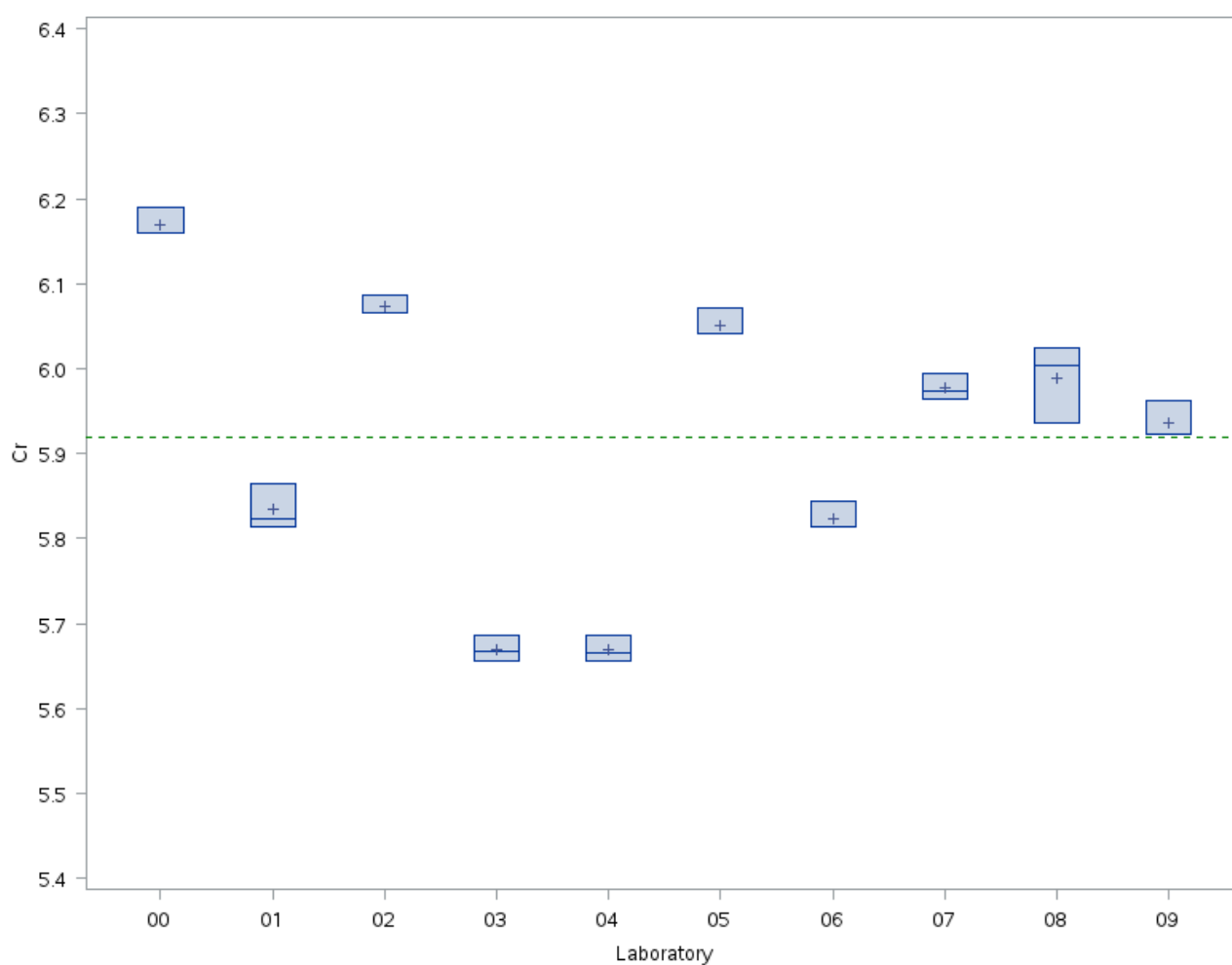
14. Results of interlaboratories tests on Coefficient of rolling resistance (Cr) – Tyre K

14.1.   Average, standard deviation, coefficient of variation in percentage, expanded uncertainty in repeatability conditions

Laboratory	N	Average	Standard_deviation	Coefficient_of_variation_perc	Repeatability_exp_uncertainty
00	3	7.166	0.020	0.285	0.041
01	3	6.987	0.008	0.119	0.017
02	3	7.244	0.021	0.284	0.041
03	3	6.850	0.006	0.084	0.011
04	3	6.830	0.017	0.256	0.035
05	3	7.353	0.026	0.358	0.053
06	3	6.975	0.027	0.382	0.053
07	3	7.294	0.020	0.274	0.040
08	3	7.067	0.015	0.216	0.031
09	3	7.094	0.010	0.141	0.020

14.2.   Confidence interval of the average per laboratory at the level 95%

Confidence_interval_av_low	Confidence_interval_av_up	T	Confidence_interval_T_low
7.142	7.189	4.303	7.115
6.977	6.996	4.303	6.966
7.221	7.267	4.303	7.193
6.843	6.856	4.303	6.836
6.810	6.850	4.303	6.787
7.323	7.383	4.303	7.288
6.945	7.006	4.303	6.909
7.271	7.317	4.303	7.244
7.050	7.085	4.303	7.030
7.083	7.105	4.303	7.069

Confidence_interval_T_up	Demi_amplitude_T
7.216	0.051
7.007	0.021
7.295	0.051
6.864	0.014
6.874	0.043
7.419	0.065
7.042	0.066
7.344	0.050
7.105	0.038
7.119	0.025

14.3. *Between and within contribution for the factor laboratory*

Laboratory	CEi	CDi
00	2.18	12.33
01	3.40	2.04
02	8.61	12.53
03	19.25	0.97
04	22.61	9.03
05	24.65	20.44
06	4.23	20.98
07	14.92	11.84
08	0.12	6.88
09	0.02	2.95

14.4. *Global average, results of precision values and measurement uncertainties*

Variable	Cr
Global_average	7.086
Repeatability_standard_deviat	0.018
Limit_of_repeatability	0.051
Repeatability_exp_uncertainty	0.037
Reproducibility_stand_deviat	0.180
Limit_of_reproducibility	0.504
Reproducibility_exp_uncertaint	0.360

14.5. *Results of measurement uncertainties in percentage*

Variable	Cr
Repe_exp_uncert_percent	0.52
Repro_exp_uncert_percent	5.08

14.6. *Part of variation in percent of the laboratories on the total variation*

Variable	Cr
Variation_part_labo	98.96

14.7. Trueness study - Estimation and significativity of the bias

Laboratory	nombre de valeurs non manquantes, Cr	Biais	Inc_biais	IC_inf_biais	IC_sup_biais	Biais_significatif
00	3	0.080	0.170	-0.254	0.413	NON
01	3	-0.099	0.170	-0.433	0.234	NON
02	3	0.158	0.170	-0.176	0.491	NON
03	3	-0.236	0.170	-0.570	0.097	NON
04	3	-0.256	0.170	-0.589	0.078	NON
05	3	0.267	0.170	-0.066	0.601	NON
06	3	-0.111	0.170	-0.444	0.223	NON
07	3	0.208	0.170	-0.126	0.541	NON
08	3	-0.019	0.170	-0.352	0.315	NON
09	3	0.008	0.170	-0.326	0.341	NON

14.8. Box-plot graphics
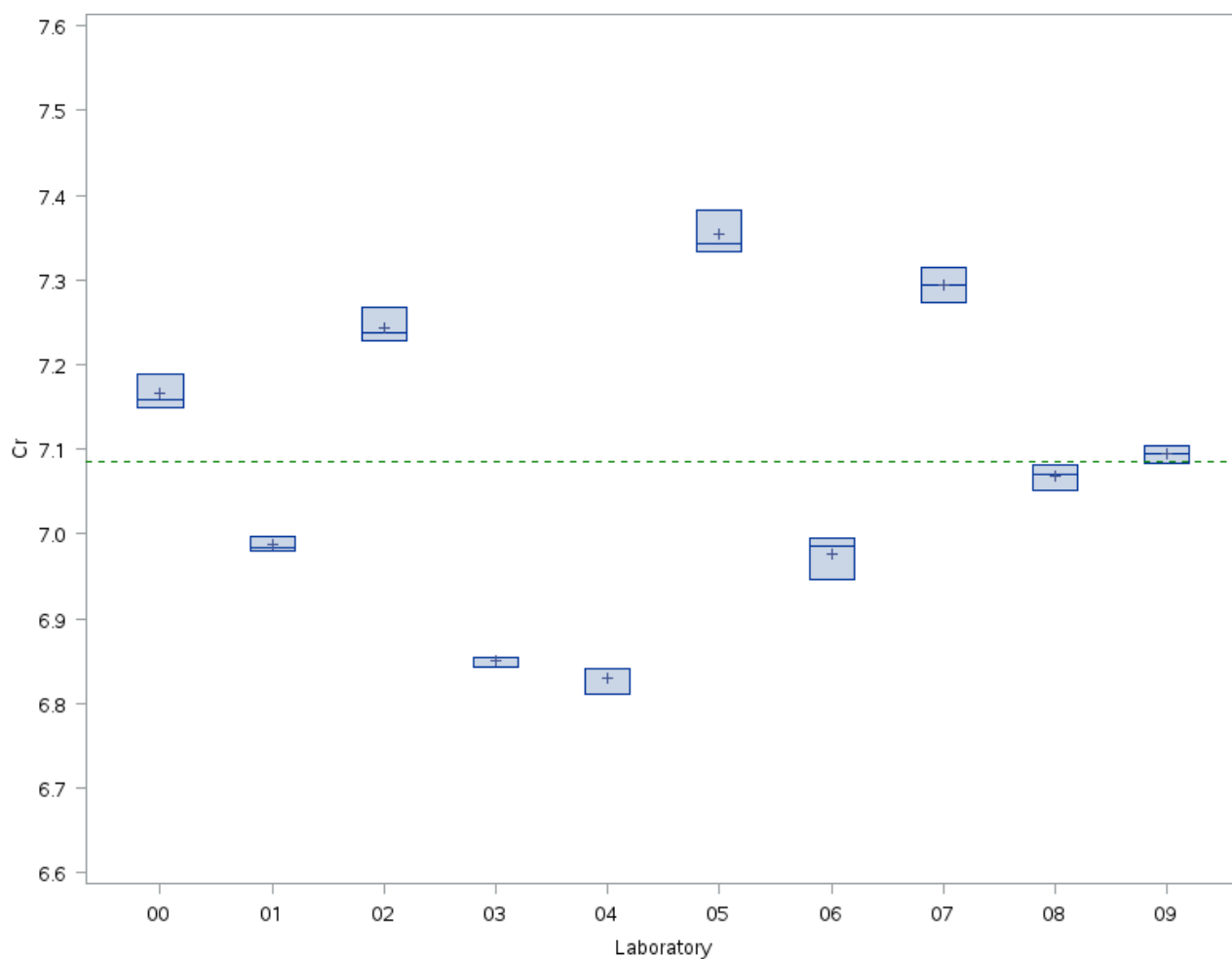
15. Calculation of assigned values

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

Batch	Assigned value	Repeatabiliy standard deviation	Reproducibility standard deviation	Variance Assigned values	Standard deviation Assigned values	Number of laboratories	Number of repetitions	Inf	Sup	Laboratory Variance
A	6.232	0.028	0.178	0.003	0.053	11	3	6.125	6.338	0.031
B	6.947	0.025	0.196	0.003	0.059	11	3	6.829	7.064	0.038
C	7.972	0.026	0.164	0.002	0.049	11	3	7.874	8.070	0.026
D	8.479	0.031	0.174	0.003	0.052	11	3	8.375	8.583	0.029
E	10.297	0.031	0.140	0.002	0.042	11	3	10.214	10.380	0.019
X	8.847	0.025	0.167	0.003	0.050	11	3	8.747	8.947	0.027

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

Batch	Assigned value	Repeatabiliy standard deviation	Reproducibility standard deviation	Variance Assigned values	Standard deviation Assigned values	Number of laboratories	Number of repetitions	Inf	Sup	Laboratory Variance
F	3.564	0.014	0.099	0.001	0.031	10	3	3.502	3.627	0.010
G	4.758	0.022	0.128	0.002	0.040	10	3	4.678	4.839	0.016
H	5.648	0.017	0.158	0.002	0.050	10	3	5.548	5.747	0.025
J	5.919	0.023	0.169	0.003	0.053	10	3	5.813	6.025	0.028
K	7.086	0.018	0.180	0.003	0.057	10	3	6.973	7.199	0.032

16. Regression functions

1. Regression functions for C1-C2 machines4 - Cr (N/kN)

Lab.	Intercept $B1_l$	Standard error Intercept	Slope $A1_l$	Standard error Slope	s (Residual standard deviation)	R^2
0	-0,4092	0,0816	1,0268	0,0097	0,0526	0,998
1	-0,2883	0,1465	1,0404	0,0179	0,0957	0,995
2	-0,2496	0,0928	1,0285	0,0113	0,0609	0,998
3	0,0940	0,0765	0,9799	0,0092	0,0524	0,998
4	0,0468	0,1361	1,0022	0,0167	0,0925	0,995
5	0,6478	0,1057	0,9527	0,0133	0,0775	0,997
6	0,3228	0,1063	0,9775	0,0131	0,0748	0,997
7	0,4692	0,1411	0,9496	0,0172	0,1009	0,994
8	-0,0733	0,0935	0,9777	0,0110	0,0627	0,998
9	-0,2249	0,0843	1,0299	0,0103	0,0556	0,998
10	-0,1815	0,1087	1,0138	0,0131	0,0719	0,997

2. Regression functions for C3 machines – Cr (N/kN)

Lab.	Intercept $B1_l$	Standard error Intercept	Slope $A1_l$	Standard error Slope	s (Residual standard deviation)	R^2
0	0,0474	0,1955	0,9830	0,0351	0,1618	0,982
1	0,0118	0,0210	1,0127	0,0039	0,0174	1,000
2	-0,0432	0,0905	0,9763	0,0159	0,0742	0,996
3	-0,0193	0,0691	1,0350	0,0129	0,0569	0,998
4	0,0403	0,0437	1,0301	0,0082	0,0364	0,999
5	0,1965	0,0396	0,9411	0,0070	0,0339	0,999
6	0,0418	0,0705	1,0047	0,0129	0,0587	0,998
7	0,1093	0,0552	0,9630	0,0098	0,0465	0,999
8	-0,0441	0,1035	1,0105	0,0188	0,0847	0,995
9	-0,1672	0,0981	1,0167	0,0175	0,0787	0,996

---

[4] $A1_l$ and $B1_l$ are the coefficients defined in annex IVa of Regulation (EC) N° 1222/2009

Annex E - Template for candidate / reference laboratory alignment

1. 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)

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

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

2. 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	$RRC_{2,l}$(kg/t)	$RRC_{3,l}$(kg/t)	$RRC_{4,l}$(kg/t)	RRC avg. (kg/t)

3. Alignment equation

Regression formula[5]:   **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 = $A1_l$ * $B2_c$ + $B1_l$

Coefficient of determination[6]: R^2 = _____

Date: _____

Stamp and Signature: _____

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[5]**$A1_l$, $B1_l$, $A2_c$ and $B2_c$ are the coefficients defined in annex IVa of Regulation (EC) N° 1222/2009**

RRC is the assigned value of the rolling resistance coefficient aligned to EU Reference.

$RRC_{m,l}$ is the individual measured value of the rolling resistance coefficient by the reference laboratory (l) (including temperature and drum diameter corrections)

$RRC_{m,c}$ is the individual measured value of the rolling resistance coefficient by the candidate laboratory (c) (including temperature and drum diameter corrections)

[6]**Coefficient of determination R^2 is defined as the sum of squares due to the regression divided by the total sum of squares. Usually, R^2 is interpreted as representing the percentage of variation of the dependent variable explained by variation of the independent variables.**

Annex F - Proposal of guidance on how to handle the process of changing alignment equations, both for Reference and Candidate Laboratories

1. The applicable alignment equation is determined based on the measurement date:
   A Rolling Resistance test result generated **before** the date of entry into force of the new EGLA alignment equations (December 2, 2019), will be aligned with the old equation and a test result generated **after** the date of entry into force (December 2, 2019), will be aligned with the new equation.

2. If a Candidate Laboratory or another machine was aligned before this date, its current alignment equation is still valid for 2 years following its alignment report issue date.

3. If a validation check on a Label grade is done by a Testing Service or another Test Laboratory after this date, it can be done according to the following multi-steps approach:

(a)   For a validation test result generated from December 2, 2019:
   ➔ Apply the alignment equation applicable from December 2, 2019.

After this first step (a), if the results confirm the level of the Label grade, the tyre is declared compliant.
If the results do not confirm the level of the Label grade the second step (b) shall be applied.

(b)   If the Label grade was originally based on an alignment report generated after 2nd December 2019, the tyre is declared non-compliant and the procedure defined in annex IVa of Regulation (EC) N° 1222/2009 shall be applied

   If the Label grade was originally based on an alignment report generated before December 2, 2019, the alignment equation applicable before 2nd December 2019 will be applied to these validation results.

After this second step (b), if these new results confirm the level of the Label grade, the tyre is declared compliant.
If these new results do not confirm the level of the Label grade, the tyre is declared non-compliant and the procedure defined in annex IVa of Regulation (EC) N° 1222/2009 shall be applied.

Annex G – Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the labelling of tyres with respect to fuel efficiency and other essential parameters and repealing Regulation (EC) No 1222/2009

EUROPEAN
COMMISSION

Brussels, 17.5.2018
COM(2018) 296 final

2018/0148 (COD)

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on the labelling of tyres with respect to fuel efficiency and other essential parameters and repealing Regulation (EC) No 1222/2009

(Text with EEA relevance)

{SEC(2018) 234 final} - {SWD(2018) 188 final} - {SWD(2018) 189 final}

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EXPLANATORY MEMORANDUM

1.   CONTEXT OF THE PROPOSAL

•   **Reasons for and objectives of the proposal**

Improving the labelling of tyres will give consumers more information on fuel efficiency, safety and noise, allowing them to obtain accurate, relevant and comparable information on those aspects when purchasing tyres. This will help improve the effectiveness of the tyre labelling scheme so as to ensure cleaner, safer and quieter vehicles and to maximise the scheme's contribution to the decarbonisation of the transport sector.

This proposal repeals and replaces Regulation (EC) No 1222/2009[7] on the labelling of tyres with respect to fuel efficiency and other essential parameters (the Tyre Labelling Regulation, TLR).

The TLR was amended twice before it entered into application, first to include a new testing method for the wet grip of C1 tyres (cars), and then to reflect the fact that a suitable international testing method of wet grip had also been developed also for C2 (vans) and C3 (heavy duty vehicles) tyres[8] and to include a laboratory alignment procedure for the measurement of rolling resistance. This proposal incorporates those amendments.

•   **Consistency with existing policy provisions in the policy area**

In 2009, the EU adopted two sets of rules relating to tyres:

–   The TLR, which set out Union requirements harmonising the information on tyre parameters to be provided to end-users allowing them to make informed purchasing choices; and

–   The Regulation on type-approval requirements[9] for the general safety of motor vehicles (the General Safety Regulation, GSR), which put in place harmonised technical requirements that tyres must satisfy before they can be placed on the Union market.

The GSR puts in place minimum requirements *inter alia* for tyres as regards:

(i) rolling resistance;

(ii) wet grip performance; and

(iii) external rolling noise of tyres.

These requirements became applicable from 1 November 2012, with a second stage of more stringent requirements for the rolling resistance starting to apply on 1 November 2016 (with further adjustments coming into application in 2018 and 2020).

Like any other products placed on the Union market, tyres must be checked by national market surveillance authorities for compliance with the applicable requirements. Regulation (EC) No 765/2008[10] establishes the framework for market surveillance by Member States and ensures efficient cross-border market surveillance.

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[7]   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, OJ L 342 of 22.12.2009, p.46

[8]   Commission Regulation (EU) No 228/2011 of 7 March 2011 amending Regulation (EC) No 1222/2009 of the European Parliament and of the Council with regard to the wet grip testing method for C1 tyres and Commission Regulation (EU) No 1235/2011 of 29 November 2011 amending Regulation (EC) No 1222/2009 of the European Parliament and of the Council with regard to the wet grip grading of tyres, the measurement of rolling resistance and the verification procedure.

[9]   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, OJ L 200 of 31.7.2009, p.1

[10]   OJ L 218, 13.8.2008, p. 30–47. See Commission proposal COM(2017)795 for a Regulation laying down rules and procedures for compliance with and enforcement of Union harmonisation legislation on products which will replace Regulation 765/2008.

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The general energy labelling framework was updated in 2017 with the adoption of Regulation (EU) 2017/1369[11]. This repealed and replaced Directive 2010/30/EU and introduced a number of new elements, such as a product registration database and new rules on visual advertising and on distance and internet sales.

Tyre labelling forms part of Union legislation on the energy efficiency of products. This includes ecodesign regulations, which set minimum requirements that energy-related products must satisfy before they can be placed on the Union market, and energy labelling regulations, which provide consumers with information on the energy consumption and other essential aspects of products, helping them to take informed, cost-effective and environment-friendly purchasing decisions that are both good for the environment and save money.

This initiative is in line with the Union's energy policy as it updates and improves the effectiveness of the existing *acquis* on tyre labelling.

• **Consistency with other Union policies**

The review of the tyre labelling scheme contributes to EU efforts to reduce the greenhouse gas emissions and air pollution caused by the transport sector.

This initiative is part of the Third "Europe on the Move" Package, which delivers on the new industrial policy strategy of September 2017, and is designed to complete the process of enabling Europe to reap the full benefits of the modernisation and decarbonisation of mobility. It is essential that tomorrow's mobility system is safe, clean and efficient for all EU citizens. The aim is to make European mobility safer and more accessible, European industry more competitive, European jobs more secure, and to be cleaner and better adapted to the imperative of tackling climate change. This will require the full commitment of the EU, Member States and stakeholders, not least in strengthening efforts to reduce greenhouse gas emissions and air pollution.

The Commission's Communication "A European Strategy for Plastics in a Circular Economy" refers to the need to study ways of reducing the unintentional release of microplastics from tyres.

2. LEGAL BASIS, SUBSIDIARITY AND PROPORTIONALITY

• **Legal basis**

Regulation (EC) No 1222/2009 is based on Article 95 of the Treaty establishing the European Community, now Article 114 of the Treaty on the Functioning of the European Union (TFEU). It is appropriate to have an internal market legal base as the Regulation is linked to type approval requirements for tyres to be placed on the Union market, but as it also covers fuel efficiency, it is appropriate to add also an energy legal base, i.e. Article 194 TFEU.

• **Subsidiarity (for non-exclusive competence)**

The instruments on energy and fuel efficiency adopted at EU level reflect the growing importance of energy as a political and economic challenge and its close links to the policy areas of security of energy supply, climate change, sustainability, environment, internal market, and economic development. To date, Member States acting alone have been unable sufficiently to achieve energy efficiency objectives and action at Union level is needed to facilitate and support the uptake of activities at national level.

It is essential to ensure a level playing field for manufacturers and dealers in terms of the information supplied to customers in respect of tyres for sale across the EU internal market. For this reason, EU - wide legally binding rules are necessary.

Market surveillance is carried out by the authorities of the Member States. In order to be effective, it must be uniform across the Union otherwise the internal market is undermined and there is a disincentive to businesses that invest resources in designing, making and selling energy- efficient products. The inclusion of tyres in a product database will help make market surveillance more effective.

• **Proportionality**

In accordance with the principle of proportionality, the proposed amendments to the existing legislative framework do not go beyond what is necessary to achieve the objectives set. They will improve its clarity and workability.

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[11]   OJ L 198, 28.7.2017, p. 1–23

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The proposed amendments will make it possible to display information about snow/ice tyres on the label, strengthen the requirement to show the label in situations where consumers do not see the tyre(s) they are considering buying (because the tyres are stocked elsewhere, or with distance or internet selling) and include tyres in the product registration database established under Regulation (EU) 2017/1369 in order to improve market surveillance and information for consumers.

Suppliers will be required to enter information in the new product database. This is information that they currently have to provide to national market surveillance authorities on request, so any additional burden is considered minimal and proportionate to the enforcement and transparency benefits that the product database is expected to bring.

An impact assessment SWD(2018)189 accompanies the proposal and reference should be made to the parts that discuss proportionality.

• **Choice of the instrument**

The current TLR is a Regulation of the European Parliament and the Council, and it is appropriate to replace it with an instrument of the same type, as it contains directly applicable obligations for economic operators.

3. RESULTS OF EX-POST EVALUATIONS, STAKEHOLDER CONSULTATIONS AND IMPACT ASSESSMENTS

• **Ex-post evaluations/fitness checks of existing legislation**

The Commission carried out an ex-post evaluation of the TLR, which can be found in Annex 5 to the impact assessment report.

The evaluation concluded that the effectiveness and efficiency of the TLR can be further improved, in particular by:

(i) increasing consumers' awareness of and confidence in the label (which will make them more likely to use the label information when purchasing tyres), and

(ii) improving market surveillance to ultimately achieve in full the three objectives of the TLR.

• **Stakeholder consultations**

A stakeholder meeting was held in November 2015 with over 40 stakeholders.

A public consultation ran from 10 October 2017 to 8 January 2018 on the Commission's consultation web page[12]. 70 responses were received and a detailed summary of the respondents and responses can be found at Annex 2 of the impact assessment report.

• **Collection and use of expertise**

As part of a specific and wide-ranging study commissioned to prepare the review[13], 6000 consumers were questioned in six Member States.

• **Impact assessment**

An impact assessment accompanies this proposal and is published on the Commission's Europa website together with the favourable opinion of the Regulatory Scrutiny Board (Ares(2018) 1626237) adopted on 23 March 2018.

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[12] https://ec.europa.eu/info/consultations/public-consultation-evaluation-and-review-eu-tyres-labelling-scheme_en

[13]

https://ec.europa.eu/energy/sites/ener/files/documents/Study%20in%20support%20of%20the%20Review%20of%20the%20Tyre%20Labelling%20Regulation_final.pdf

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The impact assessment identified a number of issues with the current Regulation, of which the two most important were:

– reduced effectiveness of the tyre label due to poor visibility;

– non-compliance due to weak enforcement.

The policy options examined were:

1. non- regulatory measures, including information campaigns, joint enforcement actions and revision of testing methods.

2. targeted legislative amendments, to allow for:

- the labelling at all times of tyres delivered with vehicles;

- online labelling;

- the inclusion on the label of snow and ice performance information;

- extending the scope of the labelling requirement to C3 tyres;

- strengthening the requirements relating to technical documentation;

- amendments to the annexes on testing methods and extending the type approval process to include the label declaration;

- the future inclusion of mileage and abrasion as a performance parameters;

- re-adjustment of the label classes; and

- the inclusion of tyres in the product registration database established under Regulation (EU) 2017/1369.

Sub-options were also considered in which some of the targeted legislative amendments mentioned above were excluded.

3. a combination of policy options 1 and 2.

The preferred option was options 3. Study of this option found the following estimated impacts (section 6 of the impact assessment report):

- increased turnover for business of EUR 9 billion per year by 2030;

- 129 PJ annual fuel savings by 2030;

- 10 Mt annual CO_2-eq savings by 2030;

- decreased noise emission from tyres and resultant health benefits; and

- greater safety and fewer accidents.

This proposal implements the legislative part of the preferred option. Further non-legislative action to implement the option is outlined in the impact assessment.

- **Regulatory fitness and simplification**

As this proposal revises existing legislation, it has explored how to simplify and improve that legislation. The text has been updated to ensure maximum consistency with other updated legislation in the field, in particular the new Energy Labelling Framework Regulation.

Three main possibilities for simplifying the legislation and reducing administrative burden were identified and included in the proposal:

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- product registration database;

- alignment with GSR testing methods; and

- wider use of delegated acts.

The estimated REFIT cost savings of these three possibilities are as following:

REFIT cost savings – preferred option(s)		
Description	**Amount**	**Comments**
Product registration database	EUR 80 000 per year	Recurrent cost savings for Member State market surveillance authorities, manufacturers and retailers. Possible cost savings for manufacturers as well. Initial marginal costs for the Commission to include tyres in the database for energy-related products.
Alignment with GSR	EUR 420 000 per year	Could require more expensive tests for manufacturers in approved testing laboratories but in return, they will not have to carry out further testing. Reduced market surveillance costs (recurrent savings).
TLR / delegated acts.	EUR 110 000 per delegated act	Will reduce the administrative costs in the EU law-making Institutions and Member States.

To ensure fair competition in the single market and coherent and consistent information for consumers the same rules should apply to all economic operators. All retailers should therefore be subject to the same rules, as tyre labels are useful for consumers only if all products are labelled in all retail outlets. As such, the proposal does not exempt SMEs or micro-enterprises. However, there are no European SME or micro tyre manufacturers, and any potential costs are not expected to be insignificant and are mainly related to the obligation on manufacturers and retailers to show the label when tyres are offered for sale online.

The proposal is internet ready as it includes tyre labelling in the online product registration database established under Regulation (EU) 2017/1369, which will simplify, accelerate and enhance the transmission of product information between manufacturers, retailers, market surveillance authorities and the consumer. Like other products, tyres use QR codes that give consumers electronic access to detailed information. These will be part of the new label.

- **Fundamental rights**

The proposal is not considered to have impacts on fundamental rights.

4. BUDGETARY IMPLICATIONS

This proposal replaces an existing Regulation on the labelling of tyres, and the administrative impact and costs are therefore estimated to be moderate, as most of the necessary structures and rules are in place.

This expenditure will be supported within the resources already foreseen in the official financial programming. No additional resources will be required from the EU budget. Moreover, this initiative does not intend to prejudge the Commission's proposal on the next Multiannual Financial Framework.

5. OTHER ELEMENTS

- **Implementation plans and monitoring, evaluation and reporting arrangements**

The impact of the new Regulation will be monitored and evaluated in an evaluation study to be carried out six years after its entry into force. The evaluation will determine whether the objectives of the initiative have been reached.

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Reporting by Member States to the Expert Group on Tyres Labelling – Market Surveillance Administrative Cooperation will provide data on market surveillance activities and compliance rates. Further data will come from the ongoing MSTyre15[14] joint surveillance action and any follow-up projects.

The proposed mandatory product registration database will also be a source of data on the basis of which to monitor and evaluate progress towards meeting the objectives of the Regulation. It will provide data on the distribution of tyres across the different performance classes. It will also support market surveillance, which is essential for enforcement of the Regulation. Enforcement will also be aided by requiring Member States to inform the Commission of the penalties and enforcement mechanisms applicable to infringements of the Regulation.

- **Detailed explanation of the specific provisions of the proposal**

The proposal retains the objectives and main principles of the current TLR but clarifies, strengthens and extends its scope by:

- updating the tyre label and allowing for its revision;

- improving the visibility of the label to consumers by requiring that it be shown in all situations where tyres are sold; and setting requirements in relation to internet and distance selling and as other situations where the tyres are not physically seen by the consumer;

- requiring that information on the snow and ice performance of tyres be included on the label;

- allowing for the future inclusion of mileage and abrasion, if appropriate, as a parameter for the label;

- allowing for the future inclusion of re-treaded tyres, if appropriate;

- requiring that the label be shown in visual advertisements and in technical promotional material;

- extending to C3 tyres the requirement for the label to be shown;

- extension of the type approval process to include the label declaration;

- improving enforcement by creating an obligation to register tyres in the product database established under Regulation (EU) 2017/1369;

- Adjusting the grading of tyre parameters in Annex I;

- Updating the label in Annex II (in particular to show a "snow" icon);

- Adding Annexes on information requirements;

- Replacing the annex on the testing method for measuring the wet grip index (G) of C1 tyres with a reference to the relevant measurement methods.

Updating the tyre label and allowing for its revision:
The label covers three parameters: rolling resistance, wet grip and external rolling noise. The classes for these parameters need to be adjusted, to take account of technological progress and the fact the GSR requirements mean that the bottom classes are in fact empty because such tyres can no longer be sold on the Union market. Article 11 of the current Regulation empowers the Commission to adopt delegated acts to amend non-essential elements and supplement the Regulation, and to adapt the annexes in the light of technical progress. The scope of the article is expanded to include changes to the label itself so that the possible future inclusion of ice, mileage and abrasion parameters and future re-adjustment of the label classes can be achieved via delegated acts.

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[14] For more information, see http://www.mstyr15.eu/index.php/en/

Improving the visibility of the label to consumers:

All tyres placed on the market must be accompanied by a label, whether in the form of a separate document or of a sticker. This obligation will apply to C3 tyres for which a full label is currently not required but only a reference to the performance parameters in promotional material. The full label will have to be shown when tyres are sold on the internet and in paper-based distance selling. It will also be shown when tyres are sold with a new vehicle and when vehicles are leased or are part of a fleet.

Requiring that information on the snow and ice performance of tyres be included on the label:

This will give consumers a fuller picture of the performance of tyres in winter conditions, in particular regarding wet grip. A suitable test and logo already exists for snow performance, and this will be included in the label. A test for ice performance is being developed, and it is proposed to use delegated powers to include this parameter in the future once the test standard is finalised.

Allowing for the future inclusion of mileage and abrasion , if appropriate, as a parameter for the label:

The mileage of tyres is related to their durability and life expectancy. Tyre abrasion is a major source of microplastics released into the environment. No test has yet been developed that would allow the mileage or abrasion rate of tyres to be measured reliably. It is therefore proposed to consider using delegated powers to include these parameters in the future, once an appropriate test standard is finalised.

Tyre re-treading is a process used to extend the life of used tyres. It is particularly relevant for C3 tyres, which make up about 30% of the market share of re-treaded tyres in Europe, corresponding to around 5 million tyres. Including re-treading tyres would have significant energy saving potential and would contribute to circular economy objectives such as waste reduction. However, as no suitable testing method exists it is therefore proposed to consider using delegated powers to include re-treaded tyres in the future, once an appropriate test standard is finalised.

Requiring that the label be shown in visual advertisements and technical promotional material:

In line with obligations on suppliers of energy-related products under Regulation (EU) 2017/1369, suppliers of tyres will have to provide information on the performance of their tyres in advertisements and technical promotional material. However, the whole label will have to be shown, not just the energy class and the range of classes available (as for the energy label).

Extending to C3 tyres the requirement for the label to be shown:

Under the current Regulation, a full label is not required for C3 tyres but only a reference to the performance parameters in promotional material. C3 tyres will now be covered by the same label requirements as C1 and C2 tyres.

Extension of the type approval process to include the label declaration:

Tyre manufacturers will be required to subject the label declaration to the type approval process thus providing an additional guarantee of the correctness of the label.

Improving enforcement by creating an obligation to register tyres in the product database established under Regulation (EU) 2017/1369:

The database for products covered by energy labelling regulations will be operational as of 1 January 2019. From that date on tyre suppliers will be obliged to enter into the database the information set out in Annex 1 to Regulation (EU) 2017/1369 (supplier identification, model of tyre, label, parameter classes and product information sheet).

Amendments to the Annexes:

The grading of the parameters in Annex I has been adjusted by redefining the boundaries between the current A-G classes to make them more accurate and to reflect the fact that the bottom class (G) is now empty because of GSR requirements.

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In Annex II the label has been amended to remove the bottom class for rolling resistance, to add an icon for snow and a QR code. Also, the appearance of the label has been aligned to a degree with the labels under the Energy Labelling Framework Regulation.

To improve and standardise information available to end users, and to align with the requirements under the Energy Labelling Framework Regulation, a new Annex III lists the minimum information required in technical documentation. A new Annex IV lists the information required in the product information sheet that must accompany tyres placed on the market and a new Annex V sets out the information to be provided in technical promotional material.

2018/0148 (COD)

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on the labelling of tyres with respect to fuel efficiency and other essential parameters and repealing Regulation (EC) No 1222/2009

(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 114 and Article 194(2) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee [15],

Having regard to the opinion of the Committee of the Regions[16],

Acting in accordance with the ordinary legislative procedure,

Whereas:

(1)   The Union is committed to building an Energy Union with a forward looking climate policy. Fuel efficiency is a crucial element of the Union's 2030 Climate and Energy Policy Framework and is key to moderating energy demand.

(2)   The Commission has reviewed[17] the effectiveness of Regulation (EC) No 1222/2009 of the European Parliament and of the Council[18] and identified the need to update its provisions to improve its effectiveness.

(3)   It is appropriate to replace Regulation (EC) No 1222/2009 by a new Regulation which incorporates amendments made in 2011 and modifies and enhances some of its provisions to clarify and update their content, taking into account the technological progress for tyres over recent years.

(4)   The transport sector accounts for a third of Union energy consumption. Road transport was responsible for about 22% of the Union's total greenhouse gas emissions in 2015. Tyres, mainly because of their rolling resistance, account for 5% to 10% of vehicles' fuel consumption. A reduction of the rolling resistance of tyres would therefore contribute significantly to the fuel efficiency of road transport and thus to the reduction of emissions.

(5)   Tyres are characterised by a number of interrelated parameters that are interrelated. Improving one parameter such as rolling resistance may have an adverse impact on others such as wet grip, while improving wet grip may have an adverse impact on

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[15]   OJ C […], […], p. […].

[16]   OJ C […], […], p. […].

[17]   COM(2017) 658 final

[18]   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 (OJ L 342 of 22.12.2009, p. 46).

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external rolling noise. Tyre manufacturers should be encouraged to optimise all parameters beyond the standards already achieved.

(6)   Fuel-efficient tyres can be cost-effective since fuel savings more than compensate for the increased purchase price of the tyres resulting from their higher production costs.

(7)   Regulation (EC) No 661/2009 of the European Parliament and of the Council[19] lays down minimum requirements for the rolling resistance of tyres. Technological developments make it possible to decrease energy losses due to tyre rolling resistance significantly beyond those minimum requirements. To reduce the environmental impact of road transport, it is therefore appropriate to update the provisions for tyre labelling to encourage end-users to purchase more fuel-efficient tyres by providing updated harmonised information on that parameter.

(8)   Traffic noise is a significant nuisance and has a harmful effect on health. Regulation (EC) No 661/2009 lays down minimum requirements for the external rolling noise of tyres. Technological developments make it possible to reduce external rolling noise significantly beyond those minimum requirements. To reduce traffic noise, it is therefore appropriate to update the provisions for tyre labelling to encourage end-users to purchase tyres with lower external rolling noise by providing harmonised information on that parameter.

(9)   The provision of harmonised information on external rolling noise also facilitates the implementation of measures to limit traffic noise and contributes to increased awareness of the effect of tyres on traffic noise within the framework of Directive 2002/49/EC of the European Parliament and of the Council[20].

(10)   Regulation (EC) No 661/2009 lays down minimum requirements for the wet grip performance of tyres. Technological developments make it possible to improve wet grip significantly beyond those requirements, and thus to reduce wet braking distances. To improve road safety, it is therefore appropriate to update the provisions for tyre labelling to encourage end-users to purchase tyres with high wet grip performance by providing harmonised information on that parameter.

(11)   In order to ensure alignment with the international framework, Regulation (EC) No 661/2009 refers to UNECE Regulation 117[21], which includes the relevant measurement methods for rolling resistance, noise, and wet and snow grip performance of tyres.

(12)   In order to provide end-users with information on the performance of tyres specifically designed for snow and ice conditions, it is appropriate to require the inclusion on the label of information requirements on snow and ice tyres.

(13)   The abrasion of tyres during use is a significant source of microplastics, which are harmful to the environment, and the Commission's Communication "A European Strategy for Plastics in a Circular Economy"[22] therefore mentions the need to address unintentional release of microplastics from tyres, *inter alia* through information

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[19]   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 (OJ L 200, 31.7.2009, p. 1).

[20]   Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (OJ L 189, 18.7.2002, p. 12).

[21]   OJ L307, 23.11.2011, p.3

[22]   COM(2018) 28 final

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measures such as labelling and minimum requirements for tyres. However, a suitable testing method to measure tyre abrasion is not currently available. Therefore, the Commission should mandate the development of such a method, taking into full consideration all state-of-the-art internationally developed or proposed standards or regulations, with a view to establishing a suitable testing method as soon as possible.

(14) Re-treaded tyres are a substantial part of the market for heavy-duty vehicle tyres. Re-treading tyres extends their life and contributes to circular economy objectives such as waste reduction. Applying labelling requirements to such tyres would bring substantial energy savings. However, as suitable testing method to measure the performance of re-treaded tyres is not currently available, this Regulation should provide for their future inclusion.

(15) The energy label pursuant to Regulation (EU) 2017/1369 of the European Parliament and of the Council[23], which ranks the energy consumption of products on a scale from 'A' to 'G', is recognised by over 85% of Union consumers and has proven to be effective in promoting more efficient products. The tyre label should continue to use the same design to the extent possible, while recognising the specificities of the tyre parameters.

(16) The provision of comparable information on tyre parameters in the form of a standard label is likely to influence purchasing decisions by end-users in favour of safer, quieter and more fuel-efficient tyres. This, in turn, is likely to encourage tyre manufacturers to optimise those parameters, which would pave the way for more sustainable consumption and production.

(17) The need for greater information on tyre fuel efficiency and other parameters is relevant for all end-users, including purchasers of replacement tyres, purchasers of tyres fitted on new vehicles, and fleet managers and transport undertakings, who cannot easily compare the parameters of different tyre brands in the absence of a labelling and harmonised testing regime. It is therefore appropriate to require the labelling of tyres delivered with vehicles at all times.

(18) Currently, labels are explicitly required for tyres for cars (C1 tyres) and vans (C2 tyres) but not for heavy duty vehicles (C3 tyres). C3 tyres consume more fuel and cover more kilometres per year than C1 and C2 tyres, and therefore the potential to reduce fuel consumption and emissions from heavy goods vehicles is significant.

(19) Including C3 tyres fully in the scope of this Regulation is also in line with the Commission's proposal for a Regulation on the monitoring and reporting of CO_2 emissions from, and fuel consumption of, new heavy-duty vehicles[24] and of the Commission's proposal on CO_2 standards for heavy-duty vehicles[25].

(20) Many end-users make tyre purchasing decisions without seeing the actual tyre and therefore do not see the label affixed to it. In all such situations, the end-user should be shown the label before finalising the purchasing decision. The display of a label on tyres at the point of sale, as well as in technical promotional material, should ensure that distributors as well as potential end-users receive harmonised information on the relevant tyre parameters at the time and place of the purchasing decision.

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[23]   Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU (OJ L 198, 28.7.2017, p. 1).
[24]   COM(2017)279
[25]   Reference to be added once the proposal is adopted

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(21)   Some end-users choose tyres before arriving at the point of sale, or purchase them by mail order or on the internet. To ensure that those end-users can also make an informed choice on the basis of harmonised information on tyre fuel efficiency, wet grip performance, external rolling noise and other parameters, labels should be displayed in all technical promotional material, including where such material is made available on the internet.

(22)   Potential end-users should be provided with information explaining each component of the label and its relevance. This information should be provided in technical promotional material, for instance on suppliers' websites.

(23)   Fuel efficiency, wet grip, external noise and other parameters concerning tyres should be measured according to reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art measurements and calculation methods. As far as possible, such methods should reflect average consumer behaviour and be robust in order to deter intentional and unintentional circumvention. Tyre labels should reflect the comparative performance of tyres in actual use, within the constraints due to the need of reliable, accurate and reproducible laboratory testing, to enable end-users to compare different tyres and so as to limit testing costs for manufacturers.

(24)   Compliance with the provisions on tyre labelling by suppliers and distributors is essential in order to ensure a level playing field in the Union. Member States should therefore monitor such compliance through market surveillance and regular ex-post controls, in line with Regulation (EC) No 765/2008 of the European Parliament and of the Council[26].

(25)   In order to facilitate the monitoring of compliance, provide a useful tool to end-users and allow alternative ways for dealers to receive product information sheets, tyres should be included in the product database established under Regulation (EU) 2017/1369. Regulation (EU) 2017/1369 should therefore be amended accordingly.

(26)   Without prejudice to Member States' market surveillance obligations and to suppliers' obligations to check product conformity, suppliers should make the required product compliance information available electronically in the product database.

(27)   In order for end-users to have confidence in the tyre label, other labels that mimic it should not be allowed. Additional labels, marks, symbols or inscriptions that are likely to mislead or confuse end-users with respect to the parameters covered by the tyre label should not be allowed for the same reason.

(28)   The penalties applicable to infringements of this Regulation and delegated acts adopted pursuant thereto should be effective, proportionate and dissuasive.

(29)   In order to promote energy efficiency, climate change mitigation and environmental protection, Member States should be able to create incentives for the use of energy efficient products. Member States are free to decide on the nature of such incentives. Such incentives should comply with Union State aid rules and should not constitute unjustifiable market barriers. This Regulation does not prejudice the outcome of any

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[26]   Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (OJ L218, 13.8.2008, p. 30).

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future state aid procedure that may be undertaken in accordance with Articles 107 and 108 of the Treaty on the Functioning of the European Union (TFEU) in respect of such incentives.

(30) In order to amend the content and format of the label, to introduce requirements with respect to re-treaded tyres, abrasion and mileage, and to adapt the Annexes to technical progress, the power to adopt acts in accordance with Article 290 of the Treaty on the Functioning of the European Union should be delegated to the Commission. It is of particular importance that the Commission carry out appropriate consultations during its preparatory work, including at expert level, and that those consultations be conducted in accordance with the principles laid down in the Interinstitutional Agreement on Better Law-Making of 13 April 2016[27]. In particular, to ensure equal participation in the preparation of delegated acts, the European Parliament and the Council should receive all documents at the same time as Member States' experts, and their experts should systematically have access to meetings of Commission expert groups dealing with the preparation of delegated acts.

(31) Tyres which were already placed on the market before the date of application of the requirements contained in this Regulation should not need to be re-labelled.

(32) In order to reinforce confidence in the label and to ensure its accuracy, the declaration that suppliers make on the label regarding the values for rolling resistance, wet grip and noise should be subject to the type approval process under Regulation (EC) No 661/2009.

(33) The Commission should carry out an evaluation of this Regulation. Pursuant to paragraph 22 of the Interinstitutional Agreement between the European Parliament, the Council of the European Union and the European Commission on Better Law-Making of 13 April 2016, that evaluation should be based on the five criteria of efficiency, effectiveness, relevance, coherence and EU value added and should provide the basis for impact assessments of possible further measures.

(34) Since the objectives of this Regulation, namely to increase the safety and economic and environmental efficiency of road transport by providing information to end-users to allow them to choose more fuel efficient, safer and less noisy tyres, cannot be sufficiently achieved by the Member States because it requires harmonised information for end users but can rather, by reason of a harmonised regulatory framework and a level playing field for manufacturers, be better achieved at Union level, the Union may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty on European Union. A Regulation remains the appropriate legal instrument as it imposes clear and detailed rules which preclude divergent transposition by Member States and thus ensures a higher degree of harmonisation across the Union. A harmonised regulatory framework at Union rather than at Member State level reduces costs for suppliers, ensures a level playing field and ensures the free movement of goods across the internal market. In accordance with the principle of proportionality, as set out in that Article, this Regulation does not go beyond what is necessary in order to achieve those objectives.

(35) Regulation (EC) No 1222/2009 should therefore be repealed.

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[27] OJ L 123, 12.5.2016, p. 1.

HAVE ADOPTED THIS REGULATION:

Article 1
Aim and subject matter

1.   The aim of this Regulation is to increase the safety, health protection, and the economic and environmental efficiency of road transport by promoting fuel-efficient and safe tyres with low noise levels.

2.   This Regulation 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.

Article 2
Scope

1.   This Regulation applies to C1, C2 and C3 tyres.

2.   This Regulation shall also apply to re-treaded tyres once a suitable testing method to measure the performance of such tyres is added to the Annexes by a delegated act pursuant to Article 12.

3.   This Regulation does not apply to:

(a)   off-road professional tyres;

(b)   tyres designed to be fitted only to vehicles registered for the first time before 1 October 1990;

(c)   T-type temporary-use spare tyres;

(d)   tyres whose speed rating is less than 80 km/h;

(e)   tyres whose nominal rim diameter does not exceed 254 mm or is 635 mm or more;

(f)   tyres fitted with additional devices to improve traction properties, such as studded tyres;

(g)   tyres designed only to be fitted on vehicles intended exclusively for racing.

Article 3
Definitions

For the purposes of this Regulation, the following definitions shall apply:

(2)   'C1, C2 and C3 tyres' means the tyre classes defined in Article 8 of Regulation (EC) No 661/2009;

(3)   're-treaded tyre' means a used tyre reconditioned by replacing the worn tread with new material;

(4)   'T-type temporary-use spare tyre' means a temporary-use spare tyre designed for use at inflation pressures higher than those established for standard and reinforced tyres;

(5)   'label' means a graphic diagram, either in printed or electronic form, including in the form of a sticker, which includes symbols in order to inform end-users

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about the performance of a tyre or batch of tyres, in relation to the parameters set out in Annex I;

(6)   'point of sale' means a location where tyres are displayed or stored and offered for sale to end-users, including car show rooms in relation to tyres offered for sale to end-users which are not fitted on the vehicles;

(7)   'technical promotional material' means documentation, in printed or electronic form, produced by the supplier to supplement advertising material with at least the technical information in accordance with Annex V;

(8)   'product information sheet' means a standard document containing the information as set out in Annex IV, in printed or electronic form;

(9)   'technical documentation' means documentation sufficient to enable market surveillance authorities to assess the accuracy of the label and the product information sheet of a product, including the information as set out in Annex III;

(10)   'product database' means the database established under Regulation (EU) 1369/2017 and which consists of a consumer-oriented public part, where information concerning individual product parameters is accessible by electronic means, an online portal for accessibility and a compliance part, with clearly specified accessibility and security requirements;

(11)   'distance selling' means the offer for sale, hire or hire purchase by mail order, catalogue, internet, telemarketing or by any other method by which the potential end-user cannot be expected to see the product displayed;

(12)   'manufacturer' means any natural or legal person who manufactures a product, or has a product designed or manufactured and places that product on the market under his name or trademark;

(13)   'importer' means any natural or legal person established in the Union who places a product from a third country on the Union market;

(14)   'authorised representative' means any natural or legal person established in the Union who has received a written mandate from a manufacturer to act on his behalf in relation to specified tasks;

(15)   'supplier' means a manufacturer established in the Union, an authorised representative of a manufacturer who is not established in the Union, or an importer, who places a product on the Union market;

(16)   'distributor' means any natural or legal person in the supply chain, other than the supplier, who makes a product available on the market;

(17)   'making available on the market' means the supply of a product for distribution or use on the Union market in the course of a commercial activity, whether in return for payment or free of charge;

(18)   'placing on the market' means the first making available of a product on the Union market;

(19)   'end-user' means a consumer, a fleet manager or a road transport undertaking, that buys or is expected to buy a tyre;

(20) 'parameter' means a tyre parameter as set out in Annex I, such as rolling resistance, wet grip, external rolling noise, snow, ice, mileage or abrasion, that has a significant impact on the environment, road safety or health during use;

(21) 'tyre type' means a version of a tyre of which all units share the same technical characteristics relevant for the label and the product information sheet and the same model identifier.

Article 4
Responsibilities of tyre suppliers

1. Suppliers shall ensure that C1, C2 and C3 tyres that are placed on the market are accompanied:

   (a) for each individual tyre, with a label complying with Annex II in the form of a sticker, indicating the information and class for each of the parameters set out in Annex I, and with a product information sheet as set out in Annex IV;

   (b) for each batch of one or more identical tyres, with a label complying with Annex II in printed format indicating the information and class for each of the parameters set out in Annex I, and with a product information sheet as set out in Annex IV.

2. In relation to tyres sold on the internet, suppliers shall ensure that the label is displayed in proximity to the price and that the product information sheet can be accessed.

3. Suppliers shall ensure that any visual advertisement for a specific type of tyre, including on the internet, shows the label.

4. Suppliers shall ensure that any technical promotional material concerning a specific type of tyre, including on the internet, meets the requirements of Annex V.

5. Suppliers shall ensure that the values, the related classes and any additional performance information they declare on the label for the essential parameters set out in Annex I have been subject to the type approval process under Regulation (EC) No 661/2009.

6. Suppliers shall ensure the accuracy of the labels and product information sheets that they provide.

7. Suppliers shall make technical documentation in accordance with Annex III available to the authorities of Member States on request.

8. Suppliers shall cooperate with market surveillance authorities and take immediate action to remedy any case of non-compliance with the requirements set out in this Regulation, which falls under their responsibility, at their own initiative or when required to do so by market surveillance authorities.

9. Suppliers shall not provide or display other labels, marks, symbols or inscriptions that do not comply with the requirements of this Regulation, if doing so would be likely to mislead or confuse end-users with respect to the essential parameters.

10. Suppliers shall not supply or display labels that mimic the label provided for under this Regulation.

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Article 5

Responsibilities of tyre suppliers in relation to the product database

1.   With effect from 1 January 2020, suppliers shall, before placing a tyre on the market, enter into the product database the information set out in Annex I of Regulation (EU) 2017/1369.

2.   Where tyres are placed on the market between *[please insert the date of entry into force of this Regulation]* and 31 December 2019, the supplier shall, by 30 June 2020, enter in the product database the information set out in Annex I of Regulation (EU) 2017/1369 in relation to those tyres.

3.   Until the information referred to in paragraphs 1 and 2 has been entered in the product database, the supplier shall make an electronic version of the technical documentation available for inspection within 10 days of a request received from market surveillance authorities.

4.   A tyre for which changes are made that are relevant for the label or the product information sheet shall be considered to be a new tyre type. The supplier shall indicate in the database when it no longer places on the market units of a tyre type.

5.   After the final unit of a type of tyre has been placed on the market, the supplier shall keep the information concerning that type of tyre in the compliance part of the product database for a period of five years.

Article 6

Responsibilities of tyre distributors

1.   Distributors shall ensure that:

(c)   tyres, at the point of sale, bear the label in accordance with Annex II in the form of a sticker provided by suppliers in accordance with point (a) of Article 4(1) in a clearly visible position;

(d)   before the sale of a tyre, belonging to a batch of one or more identical tyres, the label referred to in point (b) of Article 4(1) is shown to the end-user and is clearly displayed in the immediate proximity of the tyre at the point of sale.

2.   Distributors shall ensure that any visual advertisement for a specific type of tyre, including on the internet, shows the label.

3.   Distributors shall ensure that any technical promotional material concerning a specific type of tyre, including on the internet, meets the requirements of Annex V.

4.   Distributors shall ensure that where tyres offered for sale are not visible to the end-user, they provide end-users with a copy of the label before the sale.

5.   Distributors shall ensure that any paper-based distance selling must show the label and that the end-user can access the product information sheet through a free access website, or request a printed copy of that sheet.

6.   Distributors using telemarketing-based distance selling shall specifically inform end-users of the classes of the essential parameters on the label, and that they can access the full label and the product information sheet through a free access website, or by requesting a printed copy.

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7. In relation to tyres sold directly on the internet, distributors shall ensure that the label is displayed in proximity to the price and that the product information sheet can be accessed.

Article 7
Responsibilities of vehicle suppliers and vehicle distributors

Where end-users intend to acquire a new vehicle, vehicle suppliers and distributors shall, before the sale, provide them with the label for the tyres offered with the vehicle, as well as the relevant technical promotional material.

Article 8
Testing and measurement methods

The information to be provided under Articles 4, 6 and 7 on the parameters indicated on the label shall be obtained by applying the testing and measurement methods referred to in Annex I, and the laboratory alignment procedure referred to in Annex VI.

Article 9
Verification procedure

Member States shall assess the conformity of the declared classes for each of the essential parameters indicated in Annex I in accordance with the procedure set out in Annex VII.

Article 10
Obligations of Member States

1. Member States shall not impede the placing on the market or putting into service, within their territories, of tyres which comply with this Regulation.

2. Member States shall not provide incentives with regard to tyres below class B with respect to either fuel efficiency or wet grip within the meaning of Annex I, Parts A and B respectively. Taxation and fiscal measures do not constitute incentives for the purposes of this Regulation.

3. Member States shall lay down the rules on penalties and enforcement mechanisms applicable to infringements of this Regulation and the delegated acts adopted pursuant thereto, and shall take all measures necessary to ensure that they are implemented. The penalties provided for shall be effective, proportionate and dissuasive.

4. Member States shall, by 1 June 2020, notify the Commission of the rules referred to in paragraph 3 that have not previously been notified to the Commission, and shall notify the Commission, without delay, of any subsequent amendment affecting them.

Article 11
Union market surveillance and control of products entering the Union market

1. [*Articles 16 to 29 of Regulation (EC) No 765/2008/Regulation on compliance and enforcement proposed under COM(2017)795*] shall apply to products covered by this Regulation and by the relevant delegated acts adopted pursuant thereto.

2. The Commission shall encourage and support cooperation and the exchange of information on market surveillance relating to the labelling of products between national authorities of the Member States that are responsible for market surveillance or in charge of the control of products entering the Union market, and between them

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and the Commission, in particular by involving more closely the 'Administrative Cooperation for Market Surveillance' Expert group on Tyre Labelling.

3.   Member States' general market surveillance programmes established pursuant to [*Article 13 of Regulation (EC) No 765/2008/Regulation on compliance and enforcement proposed under COM(2017)795*] shall include actions to ensure the effective enforcement of this Regulation.

Article 12

Delegated acts

The Commission is empowered to adopt delegated acts in accordance with Article 13 in order to:

(e)   introduce changes to the content and format of the label;

(f)   introduce parameters or information requirements to the Annexes in particular for mileage and abrasion, provided suitable testing methods are available;

(g)   adapt to technical progress the values, calculation methods and requirements of the Annexes.

Where appropriate, when preparing delegated acts, the Commission shall test the design and content of the labels for specific product groups with representative groups of Union customers to ensure their clear understanding of the labels.

Article 13
Exercise of delegation

1.   The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.

2.   The power to adopt delegated acts referred to in Article 12 shall be conferred on the Commission for a period of five years from *[please insert the date of entry into force of this Regulation]*. The Commission shall draw up a report in respect of the delegation of power not later than nine months before the end of the five-year period. The delegation of power shall be tacitly extended for periods of an identical duration, unless the European Parliament or the Council opposes such extension not later than three months before the end of each period.

3.   The delegation of power referred to in Article 12 may be revoked at any time by the European Parliament or by the Council. A decision to revoke shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in the *Official Journal of the European Union* or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.

4.   Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making.

5.   As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.

6.   A delegated act adopted pursuant to Article 12 shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of two months of notification of that act to the European Parliament

and the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by two months at the initiative of the European Parliament or of the Council.

Article 14
Evaluation and report

By 1 June 2026, the Commission shall carry out an evaluation of this Regulation and present a report to the European Parliament, the Council and the European Economic and Social Committee.
That report shall assess how effectively this Regulation and the delegated acts adopted pursuant thereto have allowed end-users to choose higher performing tyres, taking into account its impacts on business, fuel consumption, safety, greenhouse gas emissions and market surveillance activities. It shall also assess the costs and benefits of independent and mandatory third party verification of the information provided in the label, taking also into account the experience with the broader framework provided by Regulation (EC) No 661/2009.

Article 15
Amendment to Regulation (EU) 2017/1369

In Article 12(2) of Regulation (EU) 2017/1369, point (a) is replaced by the following:

> "(a)   to support market surveillance authorities in carrying out their tasks under this Regulation and the relevant delegated acts, including enforcement thereof, and under Regulation (EU) [*insert reference to the present regulation*]".

Article 16
Repeal of Regulation (EC) No 2009/1222

Regulation (EC) No 2009/1222 is repealed.
References to the repealed Regulation shall be construed as references to this Regulation and read in accordance with the correlation table in Annex VIII.

Article 17
Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.
It shall apply from 1 June 2020.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the European Parliament   *For the Council*
The President   *The President*

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<u>**LEGISLATIVE FINANCIAL STATEMENT**</u>

1.   FRAMEWORK OF THE PROPOSAL/INITIATIVE
1.1.   Title of the proposal/initiative
1.2.   Policy area(s) concerned in the ABM/ABB structure
1.3.   Nature of the proposal/initiative
1.4.   Objective(s)
1.5.   Grounds for the proposal/initiative
1.6.   Duration and financial impact
1.7.   Management mode(s) planned

2.   MANAGEMENT MEASURES
2.1.   Monitoring and reporting rules
2.2.   Management and control system
2.3.   Measures to prevent fraud and irregularities

3.   ESTIMATED FINANCIAL IMPACT OF THE PROPOSAL/INITIATIVE
3.1.   Heading(s) of the multiannual financial framework and expenditure budget line(s) affected
3.2.   Estimated impact on expenditure
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3.2.2. Estimated impact on operational appropriations
3.2.3. Estimated impact on appropriations of an administrative nature
3.2.4. Compatibility with the current multiannual financial framework
3.2.5. Third-party contributions
3.3.   Estimated impact on revenue

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<u>**LEGISLATIVE FINANCIAL STATEMENT**</u>

1. FRAMEWORK OF THE PROPOSAL/INITIATIVE

1.1. Title of the proposal/initiative

Proposal for a Regulation of the European Parliament and the Council on the labelling of tyres with respect to fuel efficiency and other essential parameters and repealing Regulation (EC) No 1222/2009

1.2. Policy area(s) concerned in the ABM/ABB structure[1]

Title 32 — Energy
32 02 02 Support activities for the European energy policy and internal market

1.3. Nature of the proposal/initiative

The proposal/initiative relates to **the extension of an existing action**.

1.4. Objective(s)

1.4.1. *The Commission's multiannual strategic objective(s) targeted by the proposal/initiative*

Energy Union

1.4.2. *Specific objective(s) and ABM/ABB activity(ies) concerned*

<u>Specific objective</u>
Promoting the moderation of energy demand.
<u>ABM/ABB activity(ies) concerned</u>
ABB 1: Conventional and renewable energy
ABB 2: Research and innovation activities related to energy

1.4.3. *Expected result(s) and impact*

The expected result of this initiative is to improve the existing energy labelling scheme for tyres in the Union, which is not optimal in terms of effectiveness, compliance and level of ambition.
This proposal will enhance the protection of citizens and end-users of tyres through more effective labelling and enhanced enforcement.
The proposal will have an impact on economic operators, who will have to continue to provide and display the tyre label and provide information for market surveillance through different channels.
The proposal will have an impact on national authorities, who will be better equipped to undertake market surveillance.

1.4.4. *Indicators of results and impact*

Proportion of A-class, B-class, etc. tyres.
Proportion of non-compliant tyres found by national market surveillance authorities.

1.5. Grounds for the proposal/initiative

1.5.1. *Requirement(s) to be met in the short or long term*

The general objective of this initiative is to support the functioning of the internal market through the free movement of goods that ensure high levels of environmental and consumer protection, safety and public health (external rolling noise).

1.5.2. *Added value of EU involvement*

Action at EU level will provide end-users with the same, harmonised information in whichever Member State they choose to purchase their tyres. A tyre labelling scheme at EU level will promote energy-efficient and safe tyres that reduce noise pollution in all Member States, creating a larger market for such tyres and hence greater incentives for the tyre industry to develop them.

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[1]   ABM: activity-based management; ABB: activity-based budgeting.

> This will ensure a level playing-field for manufacturers and retailers as regards the information supplied to customers for tyres for sale across the EU internal market. For this reason, EU-wide legally binding rules are necessary.
>
> This is the only way to ensure that labels for products placed on the market are comparable in all Member States, thereby ensuring the functioning of the internal market underpinned by Article 26 TFEU.

1.5.3. *Lessons learned from similar experiences in the past*

> Although the EU has achieved a single market for tyre labels, the labels need to be updated in line with technological advances that mean that many models will be included in the highest classes, providing no differentiation for consumers, and with the fact that the worst-performing tyres are banned from the market as a result of the type-approval procedure under Regulation (EC) No 661/2009 (General Safety Regulation – GSR).
>
> Although market surveillance authorities have been checking compliance with energy label requirements, non-compliance still leads to a loss of approximately 10 % of envisaged energy savings (and monetary savings for consumers). The Commission's proposal for a new market surveillance Regulation (COM(2017) 795) aims to address such challenges for EU harmonisation legislation on products. However, market surveillance authorities in the area of tyre labelling face problems that are not resolved by that proposal: timely access to technical documentation, problems in identifying, and obtaining contact information for, foreign manufacturers, and no central system to identify equivalent models that may have already been inspected by other market surveillance authorities. Further, it has been difficult for the Commission to determine the appropriate label class requirements, because of a lack of recent public data on tyre performance.
>
> This proposal tackles these problems by establishing a link with the product registration database set up under Regulation (EU) 2017/1369 (Energy Labelling Framework Regulation), where suppliers provide performance and compliance data in a central location, accessible to the national market surveillance authorities and the Commission.

1.5.4. *Compatibility and possible synergy with other appropriate instruments*

> This initiative is coherent with the GSR, which lays down a type approval procedure with minimum requirements for tyre performance on rolling resistance, wet grip and external rolling noise.
>
> It is also coherent with Regulation (EC) No 765/2008 (the current Market Surveillance Regulation), in particular by removing overlapping provisions from the tyre labelling legislation that are already covered by market surveillance provisions for all EU harmonisation legislation.
>
> The proposed link to the product registration database allows for synergies with other EU harmonisation legislation for which such databases are established or may be established in future.

1.6. **Duration and financial impact**

Proposal/initiative of **unlimited duration**
implementation with a start-up period from 2019;
followed by full-scale operation.

1.7. **Management mode(s) planned**[2]

Direct management by the Commission
by its departments, including its staff in the Union delegations.

Comments

> This initiative requires budgetary resources for the inclusion of tyres in the energy-related products registration database established under the Energy Labelling Framework Regulation, including communication campaign and enforcement actions. This expenditure will be supported within the resources already foreseen in the official financial programming.

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[2] Details of management modes and references to the Financial Regulation may be found on the BudgWeb site: http://www.cc.cec/budg/man/budgmanag/budgmanag_en.html

2. MANAGEMENT MEASURES

2.1. Monitoring and reporting rules

A tyre labelling expert group will be the platform for discussions regarding the proper implementation of the proposed Regulation.

A final provision proposes that the Commission should evaluate and report on the implementation of the Regulation seven years after its entry into force. This should identify possible problems and shortcomings and could be the starting point for further action, including any proposals for amendment.

Management and control system

2.1.1. *Risk(s) identified*

The budget for the adjustment of the current products database for the registration of tyres has been estimated at EUR 200 000. The number of tyres models could increase and generate extra costs in the update of the database.

The risks as regards the functioning of the product registration database relate mainly to IT-related problems, such as a possible breakdown of the system and confidentiality issues.

2.1.2. *Information concerning the internal control system set up*

The control methods envisaged are laid down in the Financial Regulation and Rules of Application.

2.2. Measures to prevent fraud and irregularities

No specific measures beyond the application of the Financial Regulation.

3. ESTIMATED FINANCIAL IMPACT OF THE PROPOSAL/INITIATIVE

3.1. Heading(s) of the multiannual financial framework and expenditure budget line(s) affected

Existing budget lines

In order of multiannual financial framework headings and budget lines.

Heading of multiannual financial framework	Budget line	Type of expenditure	Contribution			
	Number [Heading…………………………………]	Diff./Non-diff[30].	from EFTA countries [31]	from candidate countries[32]	from third countries	within the meaning of Article 21(2)(b) of the Financial Regulation
1a Competitiveness for growth and jobs	32 02 02 Support activities for the European energy policy and internal market	Diff	YES	NO	NO	NO
5 Administration	32 01 01 Expenditure related to officials and temporary staff in the 'Energy' policy area	Non-diff.	NO	NO	NO	NO
5 Administration	32 01 02 External personnel and other management expenditure in support of the 'Energy' policy area	Non-diff.	NO	NO	NO	NO

New budget lines requested

In order of multiannual financial framework headings and budget lines.

Heading of	Budget line	Type of	Contribution

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[30] Diff. = Differentiated appropriations / Non-diff. = Non-differentiated appropriations.

[31] EFTA: European Free Trade Association.

[32] Candidate countries and, where applicable, potential candidate countries from the Western Balkans.

multiannual financial framework		expenditure				
	Number [Heading……………………………]	Diff./Non-diff.	from EFTA countries	from candidate countries	from third countries	within the meaning of Article 21(2)(b) of the Financial Regulation

3.2. Estimated impact on expenditure

3.2.1. Summary of estimated impact on expenditure

EUR million (to three decimal places)

Heading of multiannual financial framework	Number	1a Competitiveness for growth and employment

DG: ENER			Year 2019[33]	Year 2020	Year 2021	Year 2022	Enter as many years as necessary to show the duration of the impact (see point 1.6)			TOTAL
• Operational appropriations										
32 02 02 Complement to IT database energy-related products registration, including the information campaign and the joint enforcement actions.	Commitments	(1)	1.3	1.62						2.92
	Payments	(2)	0.8	1.12	1.0					2.92
Appropriations of an administrative nature financed from the envelope of specific programmes[34]										
32 04 03 Societal challenges		(3)								
TOTAL appropriations for DG ENER	Commitments	=1+3	1.3	1.62						**2.92**
	Payments	=2+3	0.8	1.12	1.0					**2.92**

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[33] Year N is the year in which implementation of the proposal/initiative starts.

[34] Technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

• TOTAL operational appropriations	Commitments	(4)	1.3	1.62						2.92
	Payments	(5)	0.8	1.12	1.0					**2.92**
• TOTAL appropriations of an administrative nature financed from the envelope for specific programmes	(6)									
TOTAL appropriations under HEADING 1a of the multiannual financial framework	Commitments	=4+ 6	1.3	1.62						**2.92**
	Payments	=5+ 6	0.8	1.12	1.0					**2.92**

Heading of multiannual financial framework	**5**	'Administrative expenditure'

EUR million (to three decimal places)

		Year **2019**	Year **2020**	Year **2021**	Year **2022**	Enter as many years as necessary to show the duration of the impact (see point 1.6)			**TOTAL**
DG: ENER									
• Human resources		0.055	0.055						0.110
• Other administrative expenditure		0.007	0.007						0.014
TOTAL DG ENER	Appropriations	0.062	0.062						**0.124**

TOTAL appropriations under HEADING 5 of the multiannual financial framework	(Total commitments = Total payments)	0.062	0.062						**0.124**

EUR million (to three decimal places)

		Year **2019**[35]	Year **2020**	Year **2021**	Year **2022**	Enter as many years as necessary to show the duration of the impact (see point 1.6)			**TOTAL**
TOTAL appropriations under HEADINGS 1 to 5 of the multiannual financial framework	Commitments	1.362	1.682						3.044
	Payments	0.862	1.182	1.000					3.044

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[35] Year N is the year in which implementation of the proposal/initiative starts.

3.2.2. *Estimated impact on operational appropriations*

The proposal/initiative requires the use of operational appropriations, as explained below:

Commitment appropriations in EUR million (to three decimal places)

Indicate objectives and outputs ⇩	Type[36]	Average cost	Year 2019		Year 2020		Year 2021		Year 2022		Enter as many years as necessary to show the duration of the impact (see point 1.6)						TOTAL	
			No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	No	Cost	Total No	Total cost
SPECIFIC OBJECTIVE: Promoting the moderation of energy demand.																		
Update of the IT database energy-related products registration		0.2	1	0.2													1	0.2
Maintenance of the updated IT database energy-related products registration		0.02			1	0.02											1	0.02
Technical assistance and/or studies to assess aspects of tyres necessary for implementation of the regulation and support to standardisation		0.1	1	0.1	1	0.1											2	0.2
Information campaign		2.0	0.5	1.0	0.5	1.0											1	2.0

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[36] Outputs are products and services to be supplied (e.g. number of student exchanges financed, number of km of roads built, etc.).

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Joint enforcement actions					1	0.5												1	0.5
TOTAL COST				1.3		1.62													2.92

3.2.3. *Estimated impact on appropriations of an administrative nature*

3.2.3.1. Summary

The proposal/initiative requires the use of appropriations of an administrative nature, as explained below:

EUR million (to three decimal places)

	Year **2019** [37]	Year **2020**	Year **2021**	Year **2022**	Enter as many years as necessary to show the duration of the impact (see point 1.6)			**TOTAL**
HEADING 5 of the multiannual financial framework								
Human resources	0.055	0.055						0.110
Other administrative expenditure	0.007	0.007						0.014
Subtotal HEADING 5 of the multiannual financial framework	0.062	0.062						0.124
Outside HEADING 5[38] **of the multiannual financial framework**								
Human resources								
Other expenditure of an administrative nature								
Subtotal outside HEADING 5 of the multiannual financial framework								
TOTAL	0.062	0.062						**0.124**

The appropriations required for human resources and other expenditure of an administrative nature will be met by appropriations from the DG that are already assigned to management of the action and/or have been redeployed within the DG, together if necessary with any additional allocation which may be granted to the managing DG under the annual allocation procedure and in the light of budgetary constraints.

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[37] Year N is the year in which implementation of the proposal/initiative starts.

[38] Technical and/or administrative assistance and expenditure in support of the implementation of EU programmes and/or actions (former 'BA' lines), indirect research, direct research.

3.2.3.2. Estimated requirements of human resources

The proposal/initiative requires the use of human resources, as explained below:

Estimate to be expressed in full time equivalent units

	Year **2019**	Year **2020**	Year **2021**	Year **2022**	Enter as many years as necessary to show the duration of the impact (see point 1.6)		
• **Establishment plan posts (officials and temporary staff)**							
32 01 01 01 (Headquarters and Commission's Representation Offices)	0.36	0.36					
XX 01 01 02 (Delegations)							
XX 01 05 01 (Indirect research)							
10 01 05 01 (Direct research)							
• **External staff (in Full Time Equivalent unit: FTE)**[39]							
32 01 02 01 (AC, END, INT from the 'global envelope')	0.03	0.03					
XX 01 02 02 (AC, AL, END, INT and JED in the delegations)							
XX 01 04 **yy** [40] — at Headquarters							
— in Delegations							
XX 01 05 02 (AC, END, INT — Indirect research)							
10 01 05 02 (AC, END, INT — Direct research)							
Other budget lines (specify)							
TOTAL	**0.39**	**0.39**					

The human resources required will be met by staff from the DG who are already assigned to management of the action and/or have been redeployed within the DG, together if necessary with any additional allocation which may be granted to the managing DG under the annual allocation procedure and in the light of budgetary constraints.

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[39] AC= Contract Staff; AL = Local Staff; END= Seconded National Expert; INT = agency staff; JED= Junior Experts in Delegations.

[40] Sub-ceiling for external staff covered by operational appropriations (former 'BA' lines).

Description of tasks to be carried out:

Officials and temporary staff	Administrators: 0.03 FTE as team leader 0.3 FTE as desk officers for the Regulation, the delegated acts and for support for coordination of enforcement by market surveillance authorities Assistants: 0.03 FTE as support for legislative procedures and communication
External staff	0.03 FTE (CA) as secretary of the team and responsible for logistics

3.2.4. *Compatibility with the current multiannual financial framework*

The proposal/initiative is compatible with the current multiannual financial framework.

3.2.5. *Third-party contributions*

The proposal/initiative does not provide for co-financing by third parties.

3.3. **Estimated impact on revenue**

The proposal/initiative has no financial impact on revenue.

Annex H: ANNEXES to the Proposal for a Regulation of the European Parliament and of the Council on the labelling of tyres with respect to fuel efficiency and other essential parameters and repealing Regulation (EC) No 1222/2009

EUROPEAN
COMMISSION

Brussels, 17.5.2018
COM(2018) 296 final

ANNEXES 1 to 8

ANNEXES

to the

Proposal for a Regulation of the European Parliament and of the Council

**on the labelling of tyres with respect to fuel efficiency and other essential parameters
and repealing Regulation (EC) No 1222/2009**

{SEC(2018) 234 final} - {SWD(2018) 188 final} - {SWD(2018) 189 final}

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ANNEX I
Testing, grading and measurement of tyre parameters

Part A: Fuel efficiency classes

The fuel efficiency class shall be determined and illustrated on the label on the basis of the rolling resistance coefficient (*RRC*) according to the 'A' to 'G' scale specified below and measured in accordance with Annex 6 to UNECE Regulation No 117 and its subsequent amendments and aligned according to the procedure laid down in Annex VI.

If a tyre type is approved for more than one tyre class (e.g. C1 and C2), the grading scale used to determine the fuel efficiency class of this tyre type shall be that which is applicable to the highest tyre class (e.g. C2, not C1).

C1 tyres		C2 tyres		C3 tyres	
RRC in kg/t	*Energy efficiency class*	*RRC* in kg/t	*Energy efficiency class*	*RRC* in kg/t	*Energy efficiency class*
$RRC \leq 5,4$	A	$RRC \leq 4,4$	A	$RRC \leq 3,1$	A
$5,5 \leq RRC \leq 6,5$	B	$4,5 \leq RRC \leq 5,5$	B	$3,2 \leq RRC \leq 4,0$	B
$6.6 < RRC < 7.7$	C	$5.6 < RRC < 6.7$	C	$4.1 < RRC < 5.0$	C
$7,8 \leq RRC \leq 9,0$	D	$6,8 \leq RRC \leq 8,0$	D	$5,1 \leq RRC \leq 6,0$	D
$9,1 \leq RRC \leq 10,5$	E	$8,1 \leq RRC \leq 9,2$	E	$6,1 \leq RRC \leq 7,0$	E
$RRC \geq 10,6$	F	$RRC \geq 9,3$	F	$RRC \geq 7,1$	F

Part B: Wet grip classes

1.	The wet grip class shall be determined and illustrated on the label on the basis of the wet grip index (G) according to the 'A' to 'G' scale specified in the table below, calculated in accordance with point 2 and measured in accordance with Annex 5 to UNECE Regulation 117.

2.	Calculation of wet grip index (G)

$$G = G(T) - 0,03$$

where:

$G(T)$ = wet grip index of the candidate tyre as measured in one test cycle

C1 tyres		C2 tyres		C3 tyres	
G	*Wet grip class*	*G*	*Wet grip class*	*G*	*Wet grip class*
$1,68 \leq G$	A	$1,53 \leq G$	A	$1,38 \leq G$	A
$1,55 \leq G \leq 1,67$	B	$1,40 \leq G \leq 1,52$	B	$1,25 \leq G \leq 1,37$	B
$1,40 \leq G \leq 1,54$	C	$1,25 \leq G \leq 1,39$	C	$1,10 \leq G \leq 1,24$	C
$1,25 \leq G \leq 1,39$	D	$1,10 \leq G \leq 1,24$	D	$0,95 \leq G \leq 1,09$	D
$1,10 \leq G \leq 1,24$	E	$0,95 \leq G \leq 1,09$	E	$0,80 \leq G \leq 0,94$	E
$G \leq 1,09$	F	$G \leq 0,94$	F	$0,65 \leq G \leq 0,79$	F
Empty	G	*Empty*	G	$G \leq 0,64$	G

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Part C: External rolling noise classes and measured value

The external rolling noise measured value (N) shall be declared in decibels and calculated in accordance with Annex 3 to UNECE Regulation No 117.

The external rolling noise class shall be determined and illustrated on the label on the basis of the limit values *(LV)* set out in Part C of Annex II of Regulation (EC) No 661/2009 as follows.

N in dB

External rolling noise class

$N \leq LV - 6$

$LV - 6 < N \leq LV - 3$

$N > LV - 3$

Part D: Snow grip

The snow performance shall be tested in accordance with Annex 7 to UNECE Regulation No 117.

A tyre which satisfies the minimum snow index values set out in UNECE Regulation No 117 shall be classified as a snow tyre and the following icon shall be included on the label.

Part E: Ice grip:

The ice performance shall be tested in accordance with ISO 19447.

A tyre which satisfies the minimum ice index value set out in ISO 19447 shall be classified as an ice tyre and the following icon shall be included on the label.
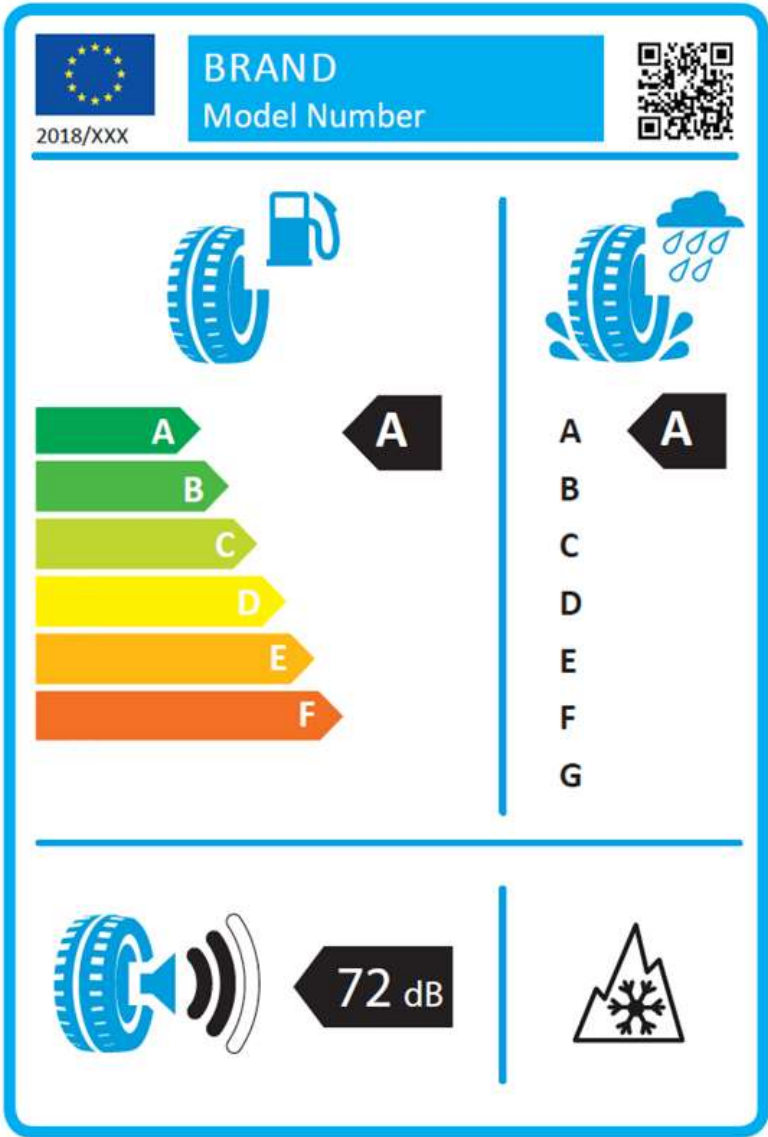
ANNEX II
Format of the label

1. Labels

1.1. The following information shall be included in the labels in accordance with the illustrations below.
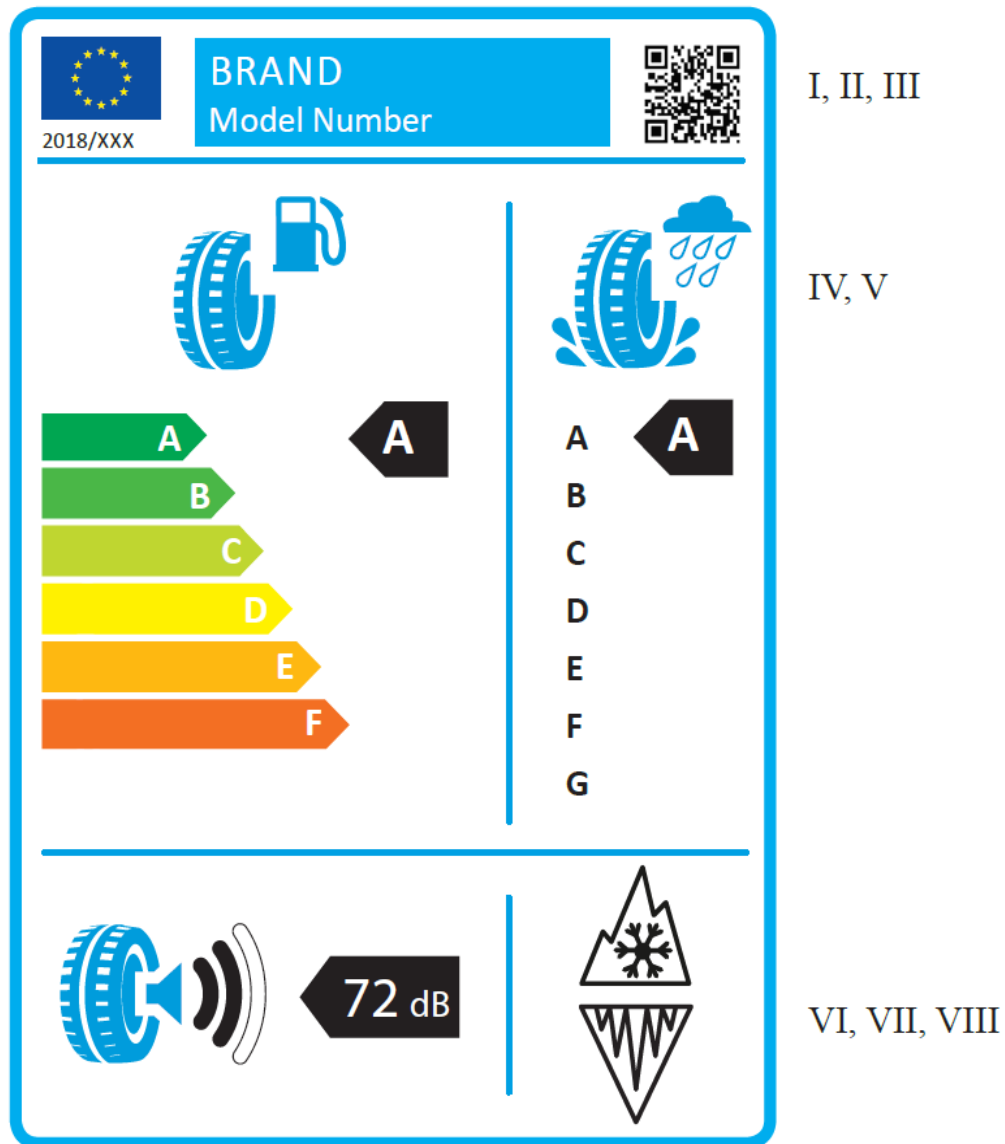
BRAND
Model Number
2018/XXX

I, II, III

IV, V

A

A

A
B
C
D
E
F

A
B
C
D
E
F
G

72 dB
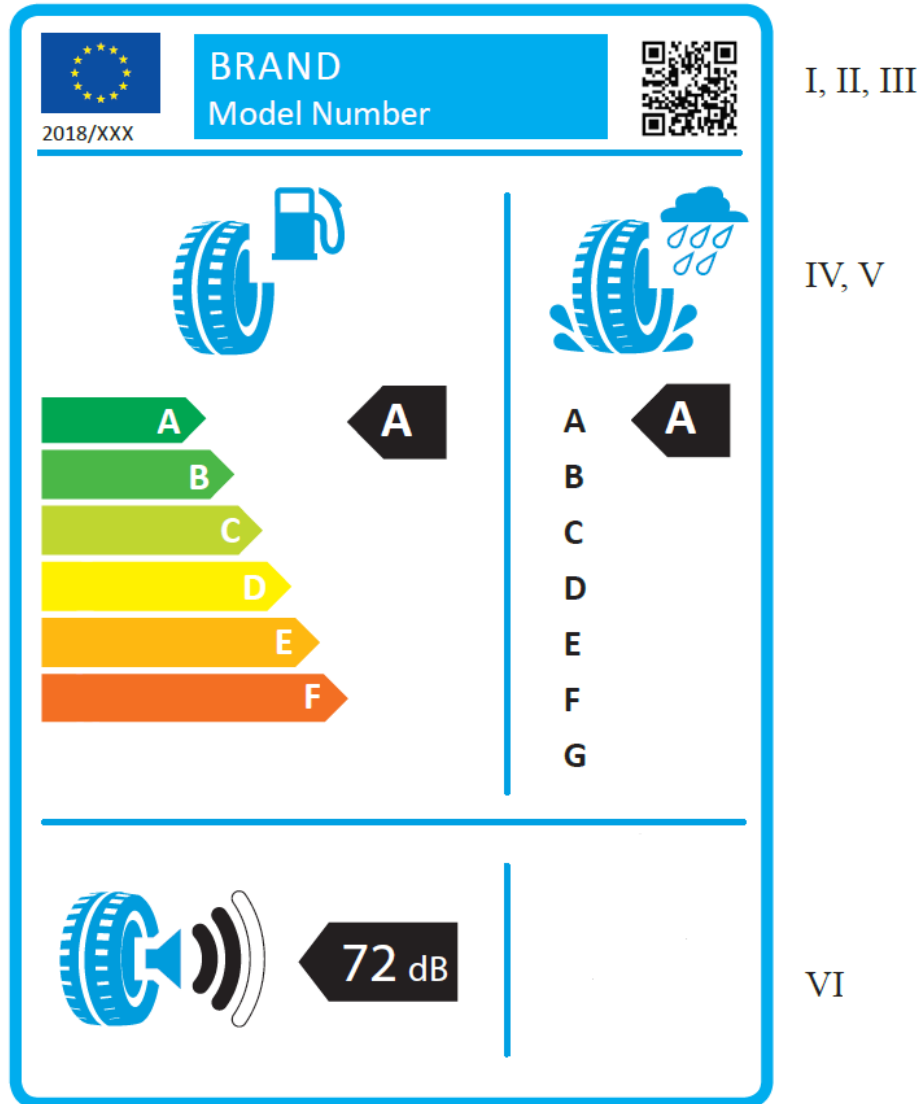
VI, VII

I. Supplier's name or trademark;

II. Supplier's model identifier, where 'model identifier' means the code, usually alphanumeric, which distinguishes a specific tyre type from other type with the same trade mark or supplier's name;

III. QR code;

IV. Fuel efficiency;

V. Wet grip;

VI. External rolling noise;

VII. Snow grip;

VIII. Ice grip.

2. Label design

2.1. The design of the label shall be as in the figure below:
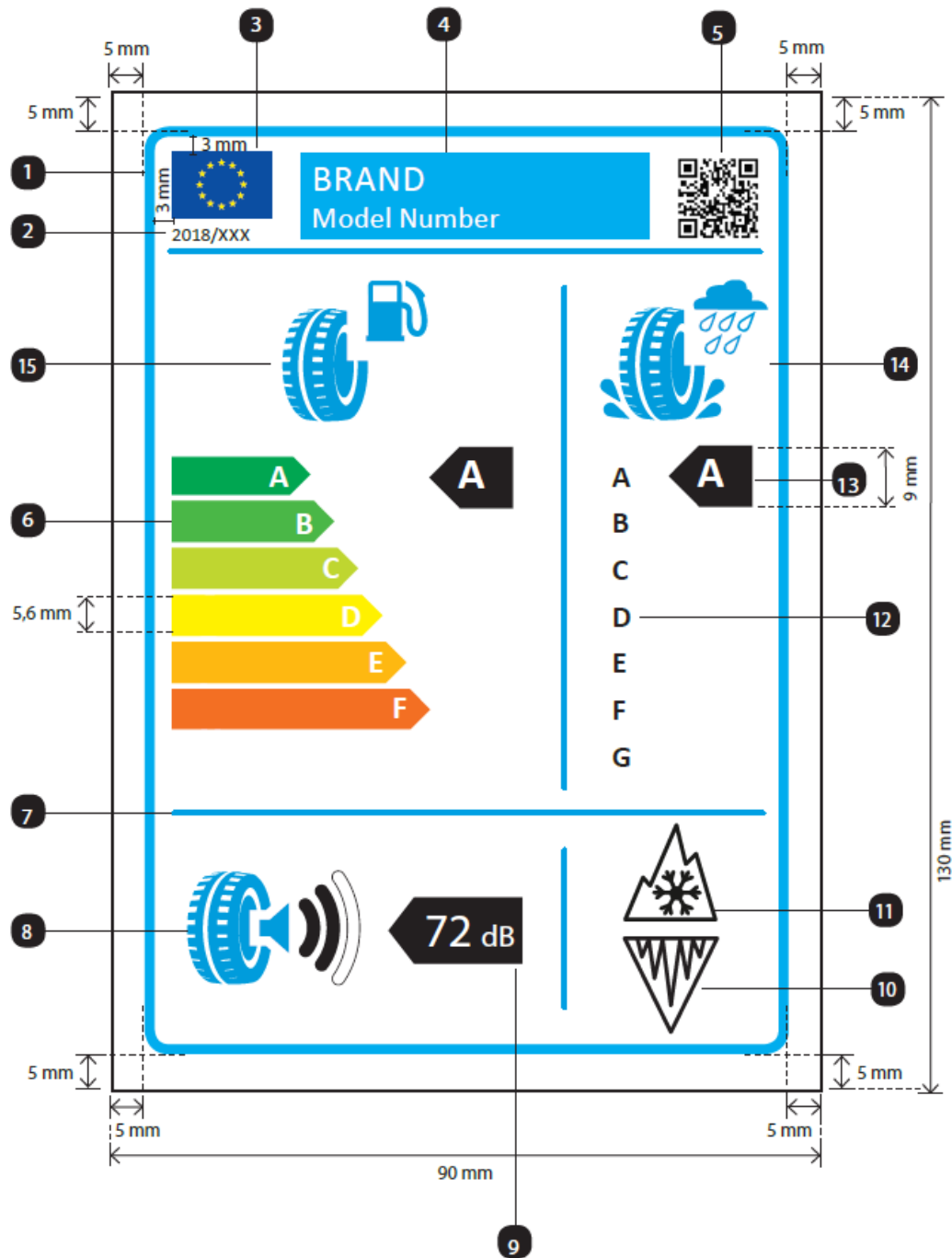
2.2. The label shall be at least 90 mm wide and 130 mm high. Where the label is printed in a larger format, its content shall nevertheless remain proportionate to the specifications above.

2.3. The label shall conform to the following requirements:

(h) Colours are CMYK - cyan, magenta, yellow and black - and are given following this example: 00-70-X-00: 0 % cyan, 70 % magenta, 100 % yellow, 0 % black;

(i)   The numbers listed below refer to the legends indicated in point 2.1.:

(1)   Label border: stroke: 1,5 pts - colour: X-10-00-05;

(2)   Calibri regular 8 pts;

(3)   European flag: width: 15 mm, height: 10 mm;

(4)   Banner: width: 51,5 mm, height: 13 mm;

   Text "BRAND": Calibri regular 15 pts, 100 % white;

   Text "Model Number": Calibri regular 13 pts, 100 % white;

(5)   QR code: width: 13 mm, height: 13 mm;

(6)   'A' to 'F' scale:

   Arrows: height: 5,6 mm, gap: 0,78 mm, black stroke: 0,5 pt - colours:

   –   A: X-00-X-00;

   –   B: 70-00-X-00;

   –   C: 30-00-X-00;

   –   D: 00-00-X-00;

   –   E: 00-30-X-00;

   –   F: 00-70-X-00.

(7)   Line: width: 88 mm, height: 2 pts - Colour: X-00-00-00;

(8)   Pictogram external rolling noise:

   Pictogram as supplied: width: 25,5 mm, height: 17 mm - colour: X-10-00-05;

(9)   Arrow:

   Arrow: width: 20 mm, height: 10 mm, 100 % black;

   Text: Helvetica Bold 20 pts, 100 % white;

   Unit text: Helvetica Bold 13 pts, 100 % white;

(10)   Pictogram ice:

   Pictogram as supplied: width: 15 mm, height: 15 mm – stroke: 1,5 pts - colour: 100 % black;

(11)   Pictogram snow:

   Pictogram as supplied: width: 15 mm, height: 15 mm – stroke: 1,5 pts - colour: 100 % black;

(12)   'A' to 'G': Calibri regular 13 pts – 100% black;

(13)   Arrows:

   Arrows: width: 11,4 mm, height: 9 mm, 100 % black;

   Text: Calibri Bold 17 pts, 100 % white;

(14)   Pictogram fuel efficiency:

   Pictogram as supplied: width: 19,5 mm, height: 18,5 mm - colour: X-10-00-05;

(15)   Pictogram wet grip:

Pictogram as supplied: width: 19 mm, height: 19 mm - colour: X-10-00-05.

(j)   The background shall be white.

2.4.   The tyre class shall be indicated on the label in the format prescribed in the illustration in point 2.1.

ANNEX III
Technical documentation

The technical documentation referred to in Article 4(7) shall include the following:

(k)   the name and address of the supplier;

(l)   identification and signature of the person empowered to bind the supplier;

(m)   trade name or trade mark of the supplier;

(n)   the tyre model,

(o)   the tyre dimension, load index and speed rating;

(p)   the references of the measurement methods applied.

ANNEX IV
Product information sheet

The information in the product information sheet of tyres shall be included in the product brochure or other literature provided with the product and shall include the following:

(q)   supplier's name or trade mark;

(r)   supplier's model identifier;

(s)   fuel efficiency class of the tyre in accordance with Annex I;

(t)   wet grip class of the tyre in accordance with Annex I;

(u)   external rolling noise class and decibels in accordance with Annex I;

(v)   whether the tyre is a snow tyre;

(w)   whether the tyre is an ice tyre.

ANNEX V
Information provided in technical promotional material

3.   Information on tyres included in technical promotional material shall be provided in the order specified as follows:

(x)   the fuel efficiency class (letter 'A' to 'F');

(y)   the wet grip class (letter 'A' to 'G');

(z)   the external rolling noise class and measured value (dB);

(aa)   whether the tyre is a snow tyre;

(bb)   whether the tyre is an ice tyre.

4.   The information provided in point 1 shall meet the following requirements:

(cc)   be easy to read;

(dd)   be easy to understand;

(ee)   if different grading is available for a given tyre type depending on dimension or other parameters, the range between the least and best performing tyre is stated.

5.   Suppliers shall also make the following available on their websites:

(ff)   a link to the relevant Commission webpage dedicated to this Regulation;

(gg)   an explanation of the pictograms printed on the label;

(hh)   a statement highlighting the fact that actual fuel savings and road safety depend heavily on the behaviour of drivers, and in particular the following:

–   eco-driving can significantly reduce fuel consumption;

–   tyre pressure needs to be regularly checked to optimise wet grip and fuel efficiency performance;

–   stopping distances must always be strictly respected.

ANNEX VI
Laboratory alignment procedure for the measurement of rolling resistance

3.   Definitions

For the purposes of the laboratory alignment procedure, the following definitions shall apply:

6.   'reference laboratory' means a laboratory that is part of the network of laboratories the name of which have been published for the purpose of the alignment procedure in the *Official Journal of the European Union,* and is able to achieve the accuracy of test results determined in Section 3 with its reference machine;

7.   'candidate laboratory' means a laboratory participating in the alignment procedure that is not a reference laboratory;

8.   'alignment tyre' means a tyre that is tested for the purpose of performing the alignment procedure;

9.   'alignment tyres set' means a set of five or more alignment tyres for the alignment of one single machine;

10.   'assigned value' means a theoretical value of the Rolling Resistance Coefficient (RRC) of one alignment tyre as measured by a theoretical laboratory which is representative of the network of reference laboratories that is used for the alignment procedure;

11.   'machine' means every tyre testing spindle in one specific measurement method. For example, two spindles acting on the same drum shall not be considered as one machine.

4.   General provisions

4.1.   Principle

The measured (*m*) Rolling Resistance Coefficient in a reference laboratory (*l*), ($RRC_{m,l}$), shall be aligned to the assigned values of the network of reference laboratories.
The *measured (m) Rolling Resistance Coefficient obtained by a machine in a candidate laboratory (c), $RRC_{m,c}$,* shall be aligned through one reference laboratory of the network of its choice.

4.2.   Tyre selection requirements

A set of five or more alignment tyres shall be selected for the alignment procedure in compliance with the criteria below. One set shall be selected for C1 and C2 tyres together, and one set for C3 tyres.

(ii)   The set of alignment tyres shall be selected so as to cover the range of different *RRCs* of C1 and C2 tyres together, or of C3 tyres. In any event, the difference between the highest RRC_m of the tyre set, and the lowest RRC_m of the tyre set shall be, before and after alignment, at least equal to:

(i)   3 kg/t for C1 and C2 tyres; and

(ii)   2 kg/t for C3 tyres.

(jj)   The RRC_m in the candidate or reference laboratories ($RRC_{m,c}$ or $RRC_{m,l}$) based on declared RRC values of each alignment tyre of the set shall be distributed evenly.

(kk)   Load index values shall adequately cover the range of the tyres to be tested, ensuring that the rolling resistance force values also cover the range of the tyres to be tested.

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Each alignment tyre shall be checked prior to use and replaced when:

(ll)   it shows a condition which makes it unusable for further tests; and/or

(mm)   there are deviations of $RRC_{m,c}$ or $RRC_{m,l}$ greater than 1,5 per cent relative to earlier measurements after correction for any machine drift.

4.3.   Measurement method

The reference laboratory shall measure each alignment tyre four times and retain the three last results for further analysis, in accordance with paragraph 4 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments and applying the conditions set out in paragraph 3 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments.

The candidate laboratory shall measure each alignment tyre (n + 1) times with n being specified in Section 5 and retain the n last results for further analysis, in accordance with paragraph 4 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments and applying the conditions set out in paragraph 3 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments.

Each time an alignment tyre is measured, the tyre/wheel assembly shall be removed from the machine and the entire test procedure specified in paragraph 4 of Annex 6 of UNECE Regulation No 117 and its subsequent amendments shall be followed again from the start.

The candidate or reference laboratory shall calculate:

(nn)   the measured value of each alignment tyre for each measurement as specified in Annex 6, paragraphs 6.2 and 6.3, of UNECE Regulation No 117 and its subsequent amendments (i.e. corrected for a temperature of 25 °C and a drum diameter of 2 m);

(oo)   the mean value of the three (in the case of reference laboratories) or n (in the case of candidate laboratories) last measured values of each alignment tyre; and

(pp)   the standard deviation (σ_m) as follows:

$$\sigma_m = \sqrt{\frac{1}{p} \cdot \sum_{i=1}^{p} \sigma^2_{m,i}}$$

$$\sigma_{m,i} = \sqrt{\frac{1}{n-1} \cdot \sum_{j=2}^{n+1} \left(Cr_{i,j} - \frac{1}{n} \cdot \sum_{j=2}^{n+1} Cr_{i,j} \right)^2}$$

where:

i is the counter from 1 to p for the alignment tyres;
j is the counter from 2 to n+1 for the n last repetitions of each measurement of a given alignment tyre
n+1 is the number of repetitions of tyre measurements (n+1=4 for reference laboratories and n+1 ≥4 for candidate laboratories);
p is the number of alignment tyres (p ≥ 5).

4.4.   Data formats to be used for the computations and results

–   The measured RRC values corrected from drum diameter and temperature shall be rounded to 2 decimal places.

–   Then the computations shall be made with all digits: there shall be no further rounding except on the final alignment equations.

–   All standard deviation values shall be displayed to 3 decimal places.

–   All RRC values will be displayed to 2 decimal places.

–   All alignment coefficients ($A1_l$, $B1_l$, $A2_c$ and $B2_c$) shall be rounded and displayed to 4 decimal places.

5. Requirements applicable to the reference laboratories and determination of the assigned values

The assigned values of each alignment tyre shall be determined by a network of reference laboratories. Every second year the network shall assess the stability and validity of the assigned values.

Each reference laboratory participating in the network shall comply with the specifications of Annex 6 of UNECE Regulation No 117 and its subsequent amendments and have a standard deviation (σ_m) as follows:

(qq)   not greater than 0,05 kg/t for class C1 and C2 tyres; and

(rr)   not greater than 0,05 kg/t for class C3 tyres.

The sets of alignment tyres, conforming to the specification of Section 2.2 shall be measured in accordance with Section 2.3 by each reference laboratory of the network.

The assigned value of each alignment tyre is the average of the measured values given by the reference laboratories of the network for this alignment tyre.

6. Procedure for the alignment of a reference laboratory to the assigned values

Each reference laboratory (l) shall align itself to each new set of assigned values and always after any significant machine change or any drift in machine control tyre monitoring data.

The alignment shall use a linear regression technique on all individual data. The regression coefficients, $A1_l$ and $B1_l$, shall be calculated as follows:

$$RRC = A1_l * RRC_{m,l} + B1_l$$

where:

RRC is the assigned value of the rolling resistance coefficient;
$RRC_{m,l}$ is the individual measured value of the rolling resistance coefficient by the reference laboratory "l" (including temperature and drum diameter corrections).

7. Requirements applicable to candidate laboratories

Candidate laboratories shall repeat the alignment procedure at least once every second year for every machine and always after any significant machine change or any drift in machine control tyre monitoring data.

A common set of five different tyres, conforming to the specification of Section 2.2 shall be measured in accordance with Section 2.3 firstly by the candidate laboratory and later on by one reference laboratory. More than five alignment tyres may be tested at the request of the candidate laboratory.

The alignment tyre set shall be provided by the candidate laboratory to the selected reference laboratory.

The candidate laboratory (c) shall comply with the specifications of Annex 6 of UNECE Regulation No 117 and its subsequent amendments and preferably have standard deviations (a_m) as follows:

(ss)   not greater than 0,075 kg/t for C1 and C2 tyres; and

(tt)   not greater than 0,06 kg/t for C3 tyres.

If the standard deviation (σ_m) of the candidate laboratory is higher than the above values with four measurements, the last three ones being used for the computations, then the number n+1 of measurement repetitions shall be increased as follows for the entire batch:

$n+1 = 1+(\sigma_m/\gamma)^2$, rounded up to the nearest higher integer value

where:

γ = 0,043 kg/t for Class C1 and C2 tyres
γ = 0,035 kg/t for Class C3 tyres

8. Procedure for the alignment of a candidate laboratory

One reference laboratory (i) of the network shall calculate the linear regression function on all individual data of the candidate laboratory (c). The regression coefficients, $A2_c$ and $B2_c$, shall be calculated as follows:

$$RRC_{m,l} = A2_c \times RRC_{m,c} + B2_c$$

where:

$RRC_{m,l}$ is the individual measured value of the rolling resistance coefficient by the reference laboratory (i) (including temperature and drum diameter corrections)
$RRC_{m,c}$ is the individual measured value of the rolling resistance coefficient by the candidate laboratory (c) (including temperature and drum diameter corrections)

If the coefficient of determination R^2 is lower than 0,97, the candidate laboratory shall not be aligned.
The aligned RRC of tyres tested by the candidate laboratory is calculated as follows:

$$RRC = (A1_l \times A2_c) \times RRC_{m,c} + (A1_l \times B2_c + B1_l)$$

ANNEX VII
Verification procedure

The conformity with this Regulation of the declared fuel efficiency, wet grip and external rolling noise classes, as well as the declared values, and any additional performance information on the label, shall be assessed for each tyre type or each grouping of tyres as determined by the supplier, according to one of the following procedures:

(uu)   a single tyre or tyre set is tested first:

1.   if the measured values meet the declared classes or external rolling noise declared value within the tolerance defined in Table 1, the test is successfully passed;

2.   if the measured values do not meet the declared classes or external rolling noise declared value within the range defined in Table 1, three more tyres or tyre sets are tested. The average measurement value stemming from the three tyres or tyre sets tested is used to assess conformity with the declared information within the range defined in Table 1;

(vv)   where the labelled classes or values are derived from type approval test results obtained in accordance with Regulation (EC) No 661/2009, or UNECE Regulation No 117 and its subsequent amendments, Member States may make use of measurement data obtained from conformity of production tests on tyres.

Assessment of the measurement data obtained from the conformity of production tests shall take into account the allowances defined in Table 1.

Table 1

Measured parameter	Verification tolerances
Rolling resistance coefficient (fuel efficiency)	The aligned measured value shall not be greater than the upper limit (the highest RRC) of the declared class by more than 0,3 kg/1 000kg.
External rolling noise	The measured value shall not be greater than the declared value of N by more than 1 dB(A).
Wet grip	The measured value G(T) shall not be lower than the lower limit (the lowest value of G) of the declared class.
Snow grip	The measured value shall not be lower than the minimum snow performance index.
Ice grip	The measured value shall not be lower than the minimum ice performance index.

ANNEX VIII
Correlation table

Regulation (EC) No 1222/2009	This Regulation
Article 1(1)	Article 1(1)
Article 1(2)	Article 1(2)
Article 2(1)	Article 2(1)
Article 2(2)	Article 2(2)
Article 3(1)	Article 3(1)
Article 3(2)	Article 3(2)
-	Article 3(3)
Article 3(3)	Article 3(4)
Article 3(4)	Article 3(5)
-	Article 3(6)
Article 3(5)	Article 3(7)
-	Article 3(8)
-	Article 3(9)
Article 3(6)	Article 3(10)
Article 3(7)	Article 3(11)
Article 3(8)	Article 3(12)
Article 3(9)	Article 3(13)
Article 3(10)	Article 3(14)
Article 3(11)	Article 3(15)
-	Article 3(16)
Article 3(12)	Article 3(17)
Article 3(13)	Article 3(18)
-	Article 3(19)
Article 4	Article 4
Article 4(1)	Article 4(1)
Article 4(1)(a)	Article 4(1)(b)
Article 4(1)(b)	Article 4(1)(b)
Article 4(2)	-
-	Article 4(2)
-	Article 4(3)
Article 4(3)	Article 4(4)
Article 4(4)	Article 4(6)
-	Article 4(5)
-	Article 4(6)
-	Article 4(7)
-	Article 4(8)
-	Article 4(9)
-	Article 5
Article 5	Article 6
Article 5(1)	Article 6(1)
Article 5(1)(a)	Article 6(1)(a)
Article 5(1)(b)	Article 6(1)(b)
-	Article 6(2)
-	Article 6(3)
Article 5(2)	Article 6(4)
Article 5(3)	-
-	Article 6(5)
-	Article 6(6)
-	Article 6(7)
Article 6	Article 7
Article 7	Article 8
Article 8	Article 9
Article 9(1)	Article 10(1)
Article 9(2)	-
Article 10	Article 10(2)

Article 11	Article 12
-	Article 12(a)
-	Article 12(b)
-	Article 12(c)
Article 11(a)	-
Article 11(b)	-
Article 11(c)	Article 12(d)
Article 12	Article 11
-	Article 11(1)
-	Article 11(2)
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-	Article 13
Article 13	-
Article 14	-
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Article 15	-
-	Article 15
-	Article 16
Article 16	Article 17

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