European Tyre and Rim Technical Organisation

RETREADED TYRES
IMPACT OF CASING AND RETREADING PROCESS ON RETREADED TYRES LABELLED PERFORMANCES

Content

1. EXECUTIVE SUMMARY

Truck tyres are typically collected after service and reused as part of a routine tyre retreading process, delaying their disposal and enhancing the environment through recycling. A used tyre can be restored after applying a new tread onto the casing via hot or cold process. The factors that play a role in the performance of a retreading tyre are related to the type, use and age of the casing as well as the tread characteristics and its related building process. The contribution of each and every factor largely varies based on the available range of casings, treads and processing conditions selected for the manufacturing of retreaded tyres.

In order to better understand how the labelling scheme could be extended to include retreaded tyres, as requested by article 14 of Regulation (EC) No 1222/2009 published in December 2009, ETRTO (European Tyre and Rim Technical Organization) has conducted and financed an extensive research program to assess the impact of factors relevant to tire performances such as Noise, Rolling and Wet grip, being subject to label as per R1222-2009.

Three experiments, using measurement methods based on existing regulation and standards for new tyres, have been organized in order to:

- Check the impact of the collected casings parameters on the rolling resistance of the retreaded tyre,
- Check the impact of the manufacturing process on the rolling resistance, wet grip and rolling sound of the retreaded tyre.

This document summarizes the ETRTO findings of these experiments, and includes all the data resulting from the experiments.

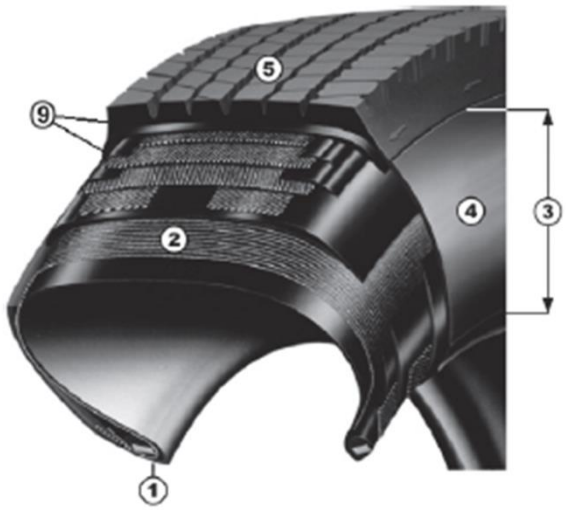
The ETRTO experiments show that the manufacturing process has a noticeable impact. The latter can be potentially mastered by the retread industry.

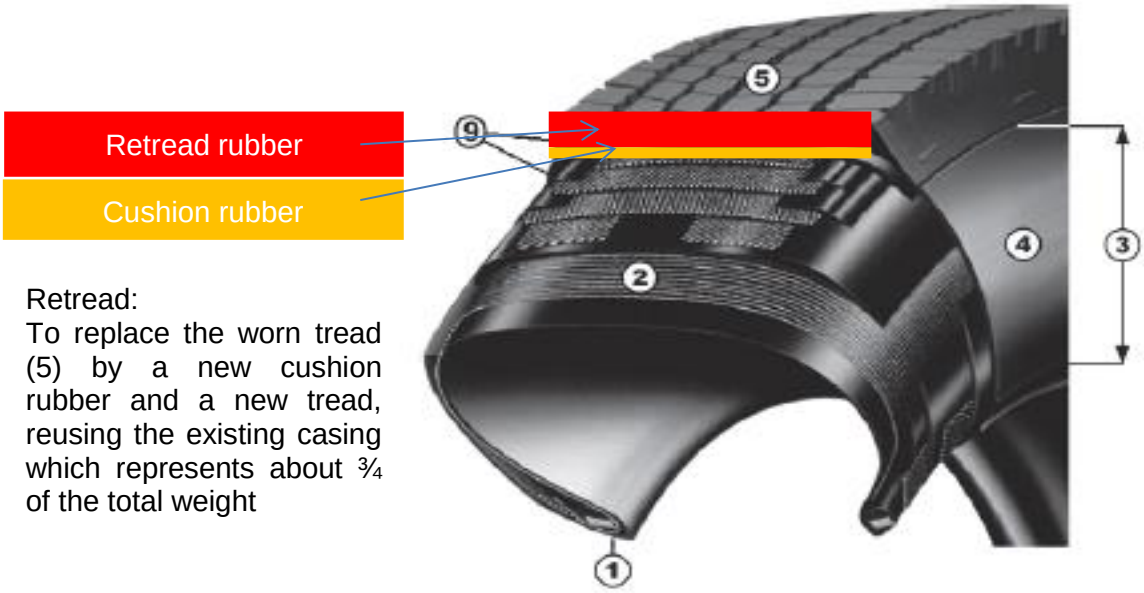
The ETRTO experiments show that the differences between hot and cold processes do not justify different approaches for retread tyres labelling, therefore a unified scheme can be applied.

About wet grip and rolling sound, the experiment has proven that the manufacturing process impacts, hence being noticeable, should most probably be mastered by retread industry, in a manner which could be sustainable, applying the current labelling scheme for C3 tyres.

About tyre rolling resistance, the ETRTO experiments have proven that casing size and brand and manufacturing process have a large impact, which can be partially mastered for manufacturing process, but cannot be mastered for the casing impact. Then, with current retreading operations, rolling resistance retreading labelling scheme same as new tyre is not feasible, unless every single retreaded tyres is tested individually, which is not sustainable for the retreading industry.

2. RETREADED TYRES: REMINDER OF CONCEPT, DEFINITION AND VOCABULARY

#	Name	Definition	
1	Bead	That part of the casing which is shaped to fit the rim	
2	Carcass/Casing	Rubber bounded cord structure of a tyre integral with the bead, which contains the inflation pressure	
3	Sidewall	Part of the pneumatic between the tread and the bead	
4	Sidewall rubber	Rubber layer on the sidewall	
5	Tread	Part of the pneumatic tyre which normally comes in contact with ground and will be worn	
9	Belts	Layer of material under the tread, that restricts the carcass in a circumferential direction	



Retread:
To replace the worn tread (5) by a new cushion rubber and a new tread, reusing the existing casing which represents about ¾ of the total weight

3. IMPACT OF CASING ON RETREADED TYRE ROLLING RESISTANCE

A retread tire is built by applying a tread onto market available casings. Since the casing is the major contributor for rolling resistance, ETRTO has considered it was essential to check the casing influence on the total rolling resistance of a retreaded tyre, which basically is the rolling resistance of the casing added to the rolling resistance of the tread.

3.1. RESULTS SUMMARY

The data show that the casing used to build the retreaded tyre strongly impacts the rolling resistance of the retreaded tyre, As a matter of fact, the casing variation could spread up to 3 label classes as shown by running the experiments at constant process type, parameters and material.

The retreaders, not mastering the incoming casing rolling resistance, will not be able to master the retreaded tyre rolling resistance, unless measuring each casing, which is not industrially and economically feasible.

It will then not be possible to predict with any reasonable accuracy what will be the final class of a retreaded tyre, using the current labelling scheme.

3.2. DESIGN OF EXPERIMENT DESCRIPTION

In order to understand and measure the impact of the casing used to build a retreaded tyre on its rolling resistance, which is one of the three performances labelled under the European Union 1222/2009 regulation, ETRTO has designed and performed a design of experiment.

Based on each member's experience, the design of experiment, run in 2012, has been set as follows:

- Four major companies participated in the study
- The experiments were conducted on two very popular sizes
  - 315/80 R 22.5 Drive or 385/65 R 22.5 Trailer
- Casings have been collected with 2 levels of criteria
  - Age: ≤ 3 years or ≥ 5 years
  - Type of use: Regional or long haul
  - Region of use: Northern Europe or Southern Europe
  - Number of retreadings: First retread or second retread
- Three repetitions were made for each experiment, and one spare casing was also collected
- Each set of casings was retreaded with a hot process and another identical set with a cold process.
- The compounds used for cold and hot retreading were as close to identical as possible (with however different curing parameters)
- All the retreads were made in the same factory at approximately the same time
- One casing of each set was measured for RR using the ISO 28580 conditions before retreading operation
- 3 retreaded tyres from each set were measured for RR using ISO 28580 conditions
- A total of 224 casings were collected and 223 RR measurements were made (100% of retreaded tyres, 33% of the buffed casing, 1 casing was damaged)

The resulting data are available in § 9.1 Design of Experiment “Casing Impact” data

3.3. DETAILED RESULTS

3.3.1. Global casing impact

As shown in §2 Retreaded tyres: reminder of concept, definition and vocabulary, retreaded tyres are composed of an existing casing and of a new tread, both having independent performances for RR. Basically, rolling resistance of casing & rolling resistance of tread should be added in order to get the rolling resistance of the retreaded tyre.

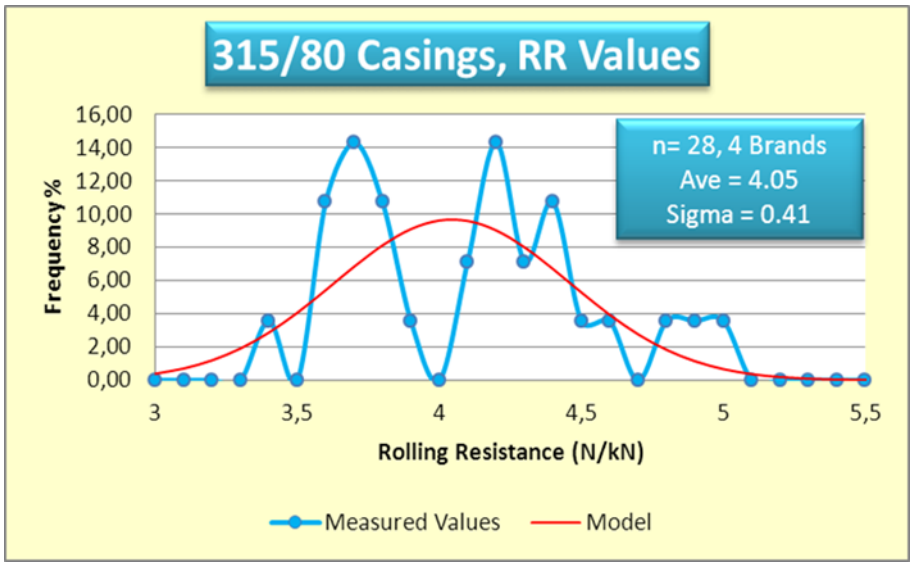
The first step of the survey has then been to analyze the contribution of the casing, the second being to analyze the total rolling resistance of the retreaded tyre.

3.3.1.1. Tyre casing rolling resistance contribution

The first step of the Design of Experiment has been to check the contribution of the casings, by measuring the rolling resistance of the casing (following regulations 1222/2009 and 1235/2011 measurement method and alignment).

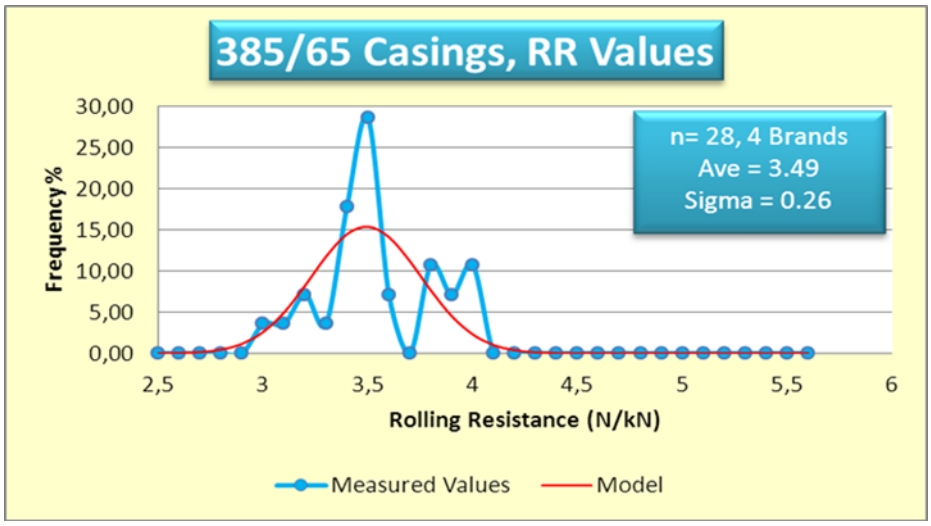
Due to their design, components, materials, usage, casing rolling resistance can vary:

- For 315/80R22.5:



  - On measured data, from 3.4 N/kN to 5 N/kN, meaning a variation of 1.6 N/kN, which can change the label up to 3 classes.
  - Average value being 4.1 N/kN, standard deviation being 0.41 N/kN, and assuming a Gauss repartition, 99.9% of the casings available on market could be in a range of 2.5 N/kN, which can as well change the label up to 3 to 4 classes

- For 385/65R22.5:



  - On measured data, from 3.0 N/kN to 4.0 N/kN, means a variation of 1.0 N/kN, which can change the label up to 2 classes.
  - Average value being 3.5 N/kN, standard deviation being 0.3 N/kN, and assuming a Gauss repartition, 99.9% of the casings available on market could be in a range of 1.6 N/kN, which can change the label up to 2 to 3 classes

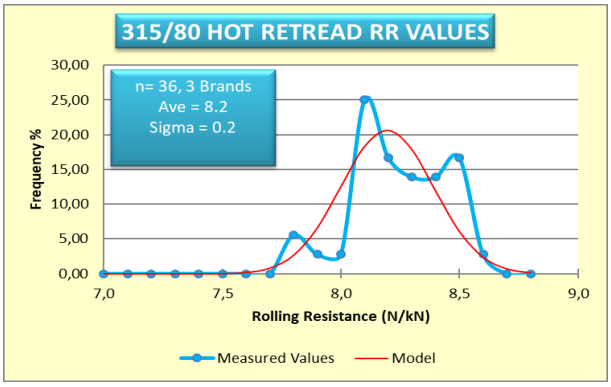
3.3.1.2. Casing impact on retreaded tyre rolling resistance and labels

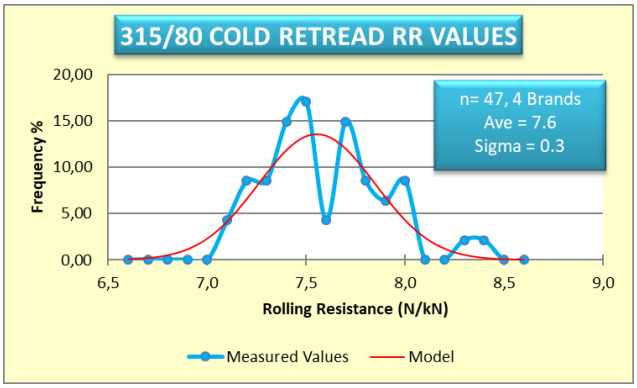
In the second step, all the available casings have been retreaded, using the cold process for half of the casing and the hot process for the second half.

For each process, hot and cold, the same compound, pattern and parameters have been used.

After retreading, rolling resistance of each retreaded tyre has been measured, following 1222-2009 and 1235-2009 measurement method and alignment.

- For 315/80R22.5:

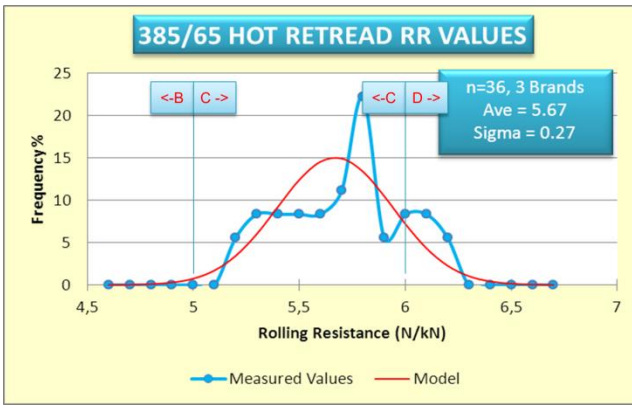


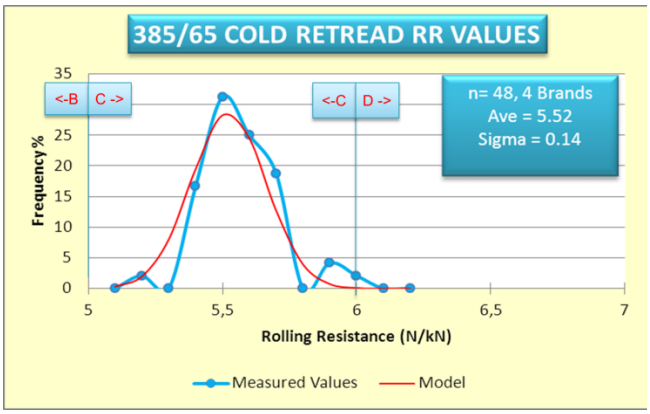


On average there is a 23% chance that a hot retreaded 315/80 R 22.5 casing should result in a tyre graded E, and a 77% chance it should be F, without solution to predict which label E/F is the right one.

On average there is a 4% chance that a cold retreaded 315/80 R 22.5 casing will result in a tyre that should be graded D, a 5% chance it should be F, and a 90% chance it should be E. The possible results cover 3 classes of grading, , without solution to predict which label D/E/F is the right one.

- For 385/65R22.5:

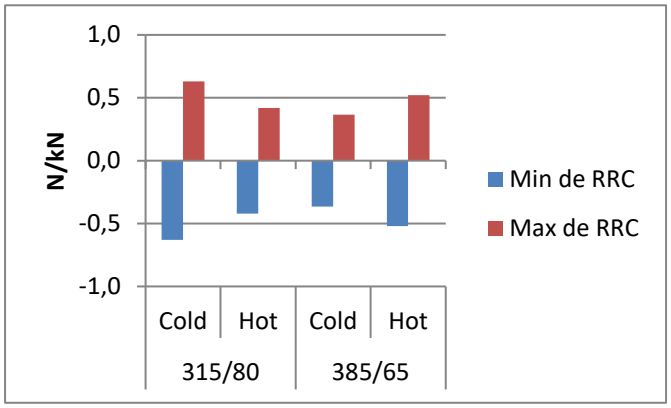




On average there is nearly a 5% chance that a hot retreaded 385/65 R 22.5 casing will result in a tyre that should be graded D, and a 95% chance it should be graded C. There is also a small chance it should be B. without solution to predict which label B/C/D is the right one.

On average there is nearly a 100% chance that a cold retreaded 385/65 R 22.5 casing will result in a tyre graded C, because the average of the measured tyres, plus /minus 3 sigma, is equal to a range from 5 to 6, which is same as class C

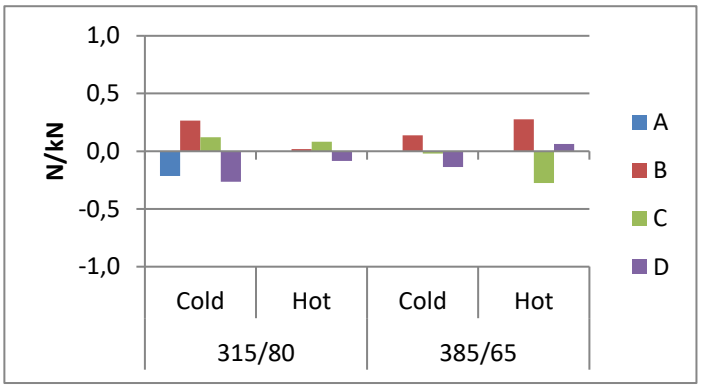
Data show that rolling resistance of retreaded tyres sample are spread on at least 0.7~~3~~ N/kN (385/65 Cold), and up to 1.~~23~~ 2 N/kN (315/80R22.5 Cold), not including spreading of population assuming a Gauss repartition, which would increase the spread up to 1.7~~74~~ N/kN with 6 sigma. Depending on the average value, these values indicate that at least 2 labels will be covered by one retreaded tyre, using the same process, compound, pattern and parameters, depending on the casing origin.



Global casing impact on rolling resistance:

Comparing the minimum and maximum value of casings of same size retreaded with the same process and same components, these data show again that casing origin (brand, individual casing, and all the other parameters) has a strong impact on the final result, the maximum difference being 1.3 N/kN on the selected sample.

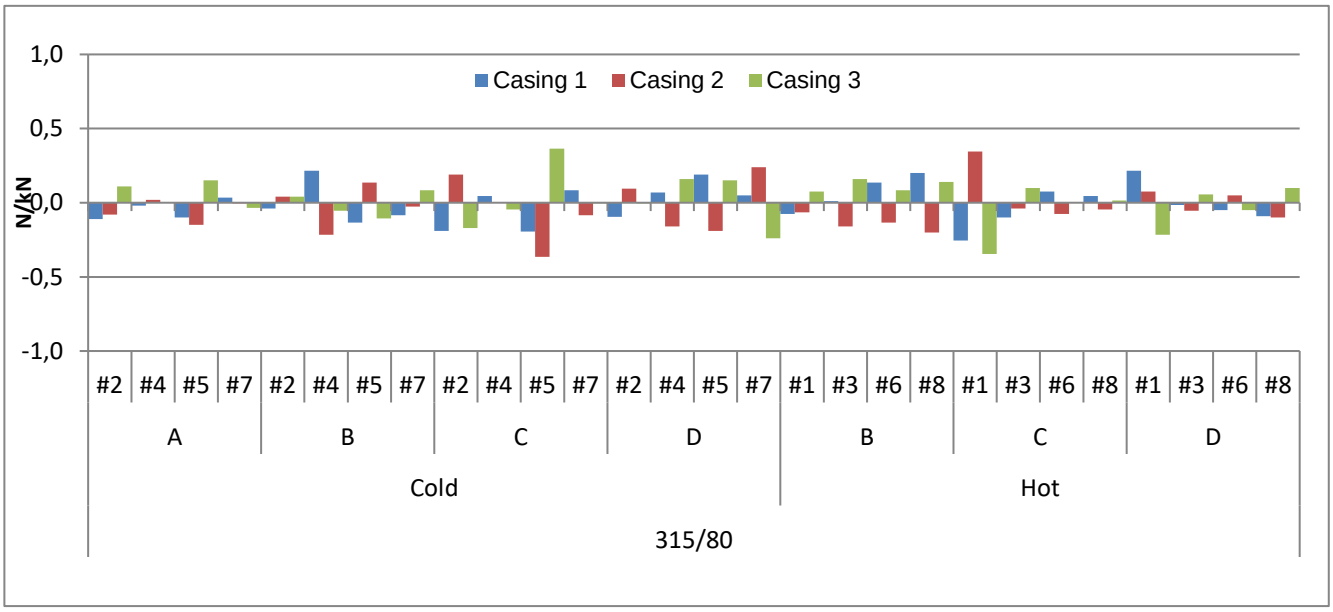
3.3.2. Impact of casing brand



Comparing the average of each casing brand to the central value, these data show that casing brand has a strong impact on the final result (range up to 0.6 N/kN)

3.3.3. Impact of casing unit

Comparison of individual casings, grouped by brand, history, retread parameters, then fully identical



These data show that among identical brand/history, the casing individuals have a strong impact on the final result :

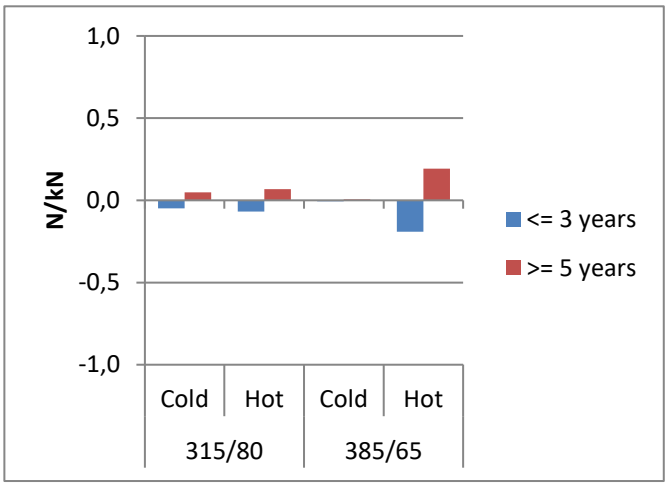
Max impact	0,73	Average impact	0,21	Impact standard deviation	0,17

With the same casing brand, history and retread process, variation can be summarized as follows:

Max variation :	0,73	Average variation :	0,21	standard deviation	0,17

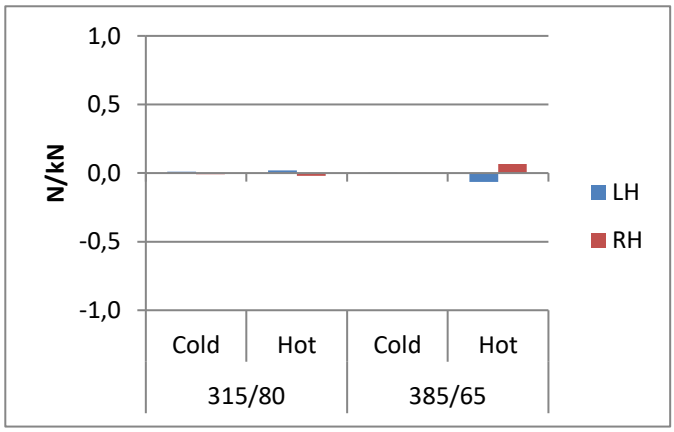
Conclusion is that Individual identical casing (coming from identical tyre model) have a strong impact.

3.3.4. Impact of casing age



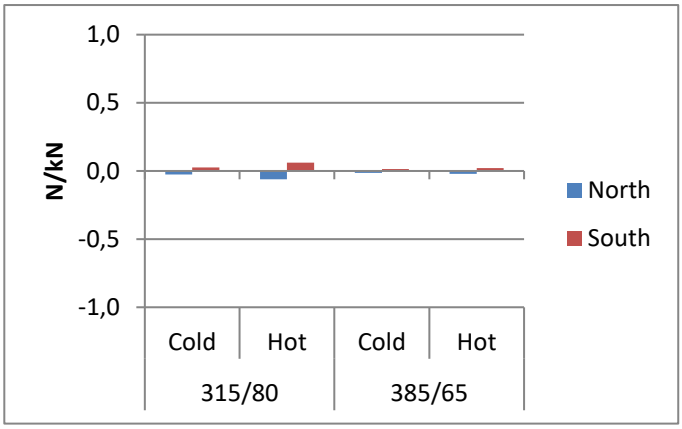
Comparing the average of each casing brand to the central value, these data show that casing age (lower or equal to 3 years, or superior or equal to 5 years), A slight trend of rolling resistance increasing with casing age can be observed, especially for 385/65R22.5 with hot retread. However, the possible impact seems low, and should be confirmed by an extensive survey.

3.3.5. Impact of casing usage (LH = Long Haul, RH = Regional Haul)



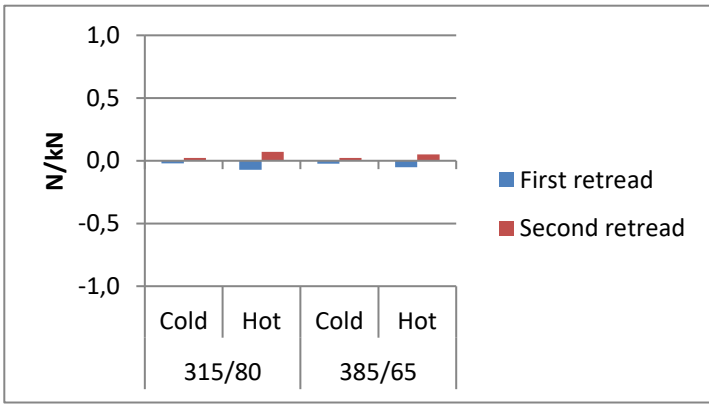
No significant impact can be observed by this survey

3.3.6. Impact of area of usage (North or South)



No significant impact can be observed, with a trend of higher RR for southern sourcing.

3.3.7. Impact of number of retread (first or second retread)



No significant impact can be observed for cold retread. However, for hot retread, a light increase of rolling resistance with number of retread can be observed. To be confirmed.

3.4. CONCLUSION ON CASING IMPACT ON ROLLING RESISTANCE OF RETREADED TYRE

The clearly relevant factors having an impact on retreaded tyre rolling resistance are **the brand** of the casing, and the casing variability among identical casings, causing the final retreaded tyre label spreading **on at least one label and up to 3 labels**. Other factors, individually considered, seem to have a low or non-significant impact. However, all the factors, considered together, could reach a significant level, potentially shifting a label from one class to another one.

4. CASINGS AVAILABLE ON THE MARKET, AVERAGE AND STANDARD DEVIATION BY MAJOR SIZES

Considering the heavy impact of casings brand and size seen in above §3 "Impact of casing on retreaded tyre rolling resistance", ETRTO has considered it was essential to check the casing rolling resistance average and standard deviation for the major sizes and usage of casing available on the European market.

4.1. RESULTS SUMMARY

The data show that the most influencing parameters impacting the rolling resistance of the casings are the corresponding size and the brand of the casing used to build the retreaded tyre. Other casing parameters, e.g. the designed tyre application, are not strongly impacting the rolling resistance.

For each casing size, the total variation of rolling resistance is in a range of about 1 kg/T, and can be represented by the same standard deviation of 0.4 N/kN, which is the worst case, obtained for one of the most popular size.

4.2. DESIGN OF EXPERIMENT DESCRIPTION

In order to understand and measure the impact of the major sizes available on the market and used by retreaders, ETRTO has designed and performed a new design of experiment. Based on each member's experience, including the Bipaver representative expertise for retread, the design of experiment, run in 2017 and 2018, has been set up as following:

- Six major companies (new tyre manufacturers and/or retreaders) participated and financed this study.
- Selected sizes and usages
  - ETRTO has selected the 10 sizes from 9 brands (European and non-European), having the highest volume on the new tyre market, after checking European market volumes given by ETRMA pool (market date given in annex §9.2.2 European new tyre market data 2016, provided by ETRMA pool)
  - The 10 selected sizes represent about 90% of the new tyre market, and a more important share of the retreaded market (estimated to 95%), as they are the most retreaded sizes by retreading industry (no detailed market data available since no pool for retreaded tyres)
  - For each size the most relevant and representative usage of the size has been selected
  - A total of 379 casings have been supplied by a casing collector to Marangoni, who performed the inspection (including shearography), buffing and rolling resistance measurements
  - The selected sizes, usage per size, casings brands and number can be found in annex §9.2.1 Tables of sizes, usage, number of companies and number of selected casing
- Buffing process
  - The target for buffing process was to reach a maximum remaining rubber thickness at the casing axle of 3 mm, if possible using a buffing radius considered by retreading expert as a market average.
  - However, it was also requested to keep a rubber thickness at casing shoulders as near as possible to the center thickness, in order to eliminate RR deviation due to casing design variations.
- Rolling resistance measurement
  - Rolling resistance measurement was performed following ISO 28580 standard
  - The rolling resistance machine was aligned as for new tyres, as prescribed in regulation EU 1222/2009 and/or 1235/2011.
- A total of 379 casings from 9 brands 10 sizes and 4 usages were collected. and 361 RR measurements were made (remaining casings discarded due to damages), and the detailed results can be found in § 9.2 Design of Experiment "Casing Average and Standard Deviation".

4.3. DETAILLED RESULTS

4.3.1. Buffing results, and buffing impact

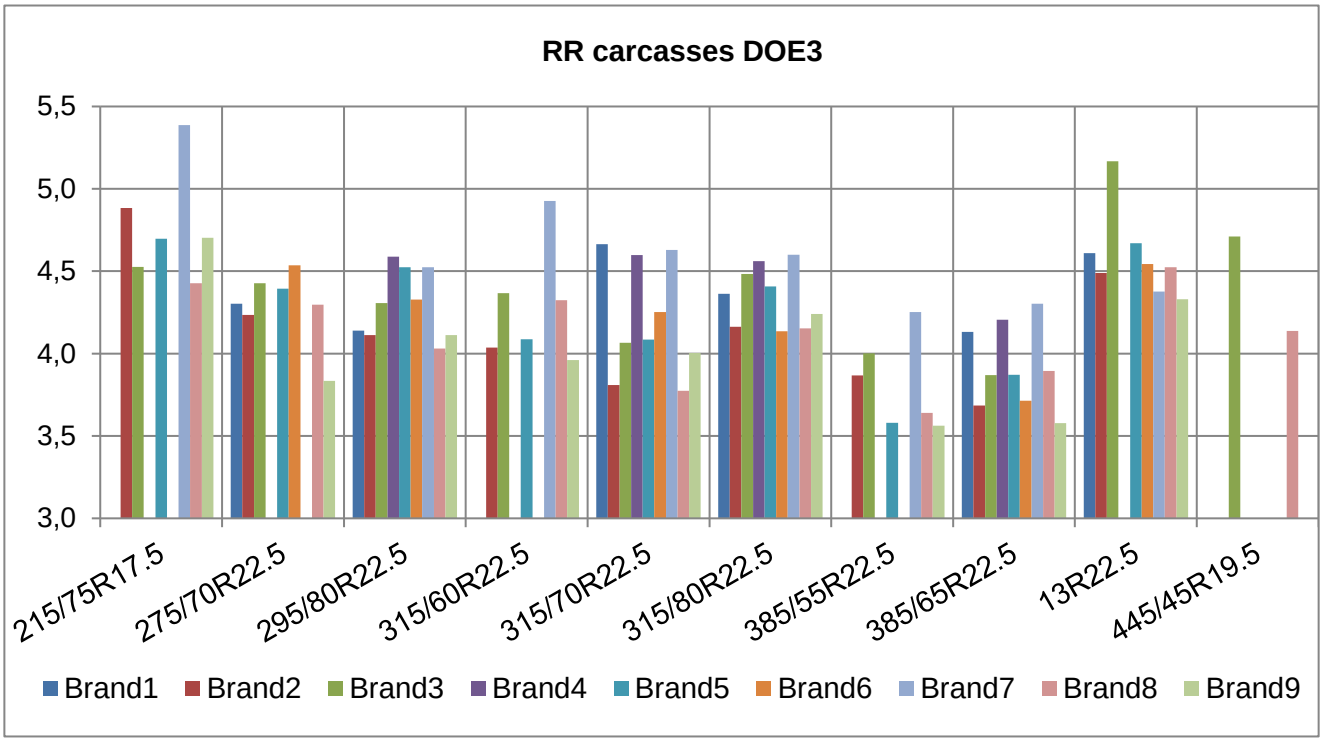
Casing size	Min Buffing Radius	Max Buffing Radius	Minimal center thickness	Maximal center thickness	Minimal shoulder thikness	Maximal shoulder thickness
13R22.5	650	650	3.0	3.0	2.0	4.0
215/75R17.5	450	650	2.5	3.0	1.0	3.0
275/70R22.5	800	1 100	2.5	3.0	1.5	3.5
295/80R22.5	700	1 100	2.5	3.0	1.5	4.0
315/60R22.5	1 500	2 000	2.6	3.0	1.5	3.0
315/70R22.5	750	1 400	2.5	3.0	1.0	4.0
315/80R22.5	700	900	2.5	3.0	1.5	3.5
385/55R22.5	1 500	2 000	2.5	3.0	1.8	4.0
385/65R22.5	1 200	2 500	2.5	3.0	1.2	4.0
445/45R19.5	3 000	3 000	3.0	3.0	2.0	3.0
Total général	**450**	**3 000**	**2.5**	**3**	**1**	**4**

- The target of 3mm maximum at the center has been reached
- The average market buffing radius could not be used for all the casings. Depending of the casing brand and design, for the same size (385/65R22.5), buffing radius allowing to reach a constant remaining rubber at shoulder of about 3 mm can vary from 1200 to 2500 mm, which is an important variation.

As a conclusion, the buffing radius cannot be fixed as a standardized parameter, as depending on the new tyre design and molding parameters

4.3.2. Brand impact for casing RR

The brand impact which was initially established for 2 main market sizes (see §3 Impact of casing on retreaded tyre rolling resistance) has been confirmed for the 10 sizes in the survey:



As in initial design of experiment, brands have a clear impact on casing RR, giving a range of 3 labels for the same size of tyre, assuming the same RR for tread and process. Size as well has a clear impact on the casing RR average.

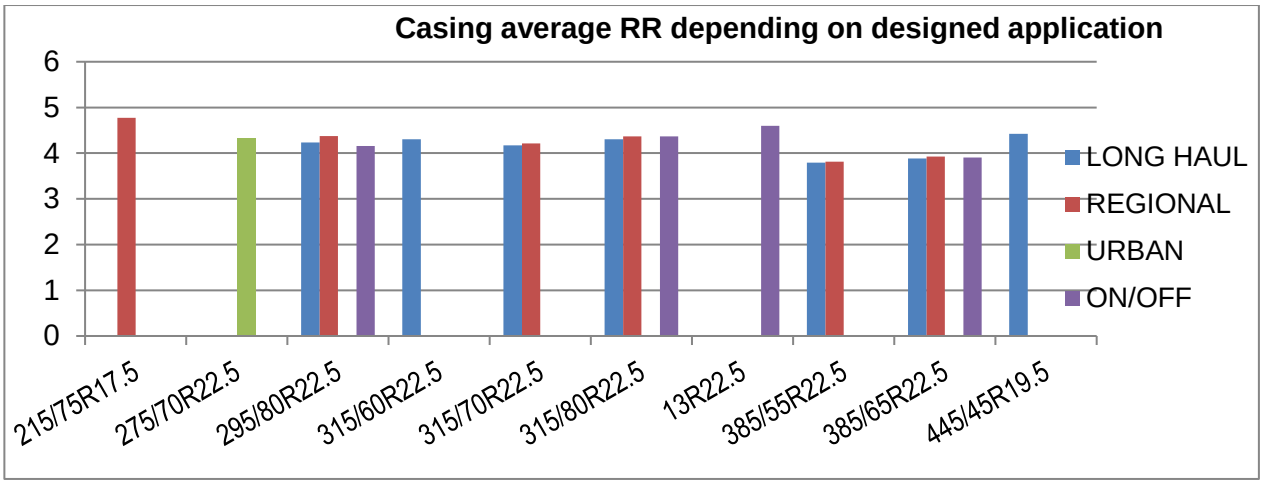
Size	RR Average	Std Deviation	RR min	RR max	Range
215/75R17.5	4.8	0.3	4.4	5.6	1.2
275/70R22.5	4.3	0.2	3.7	4.7	1.0
295/80R22.5	4.3	0.2	3.9	4.8	0.9
315/60R22.5	4.3	0.3	3.9	5.2	1.3
315/70R22.5	4.2	0.4	3.6	4.9	1.3
315/80R22.5	4.3	0.2	3.8	4.8	1.0
13R22.5	4.6	0.3	4.2	5.3	1.1
385/55R22.5	3.8	0.3	3.4	4.4	1.0
385/65R22.5	3.9	0.3	3.4	4.5	1.1
445/45R19.5	4.4	0.3	4.1	4.7	0.6
Total général	**4.2**				
Range	**1.0**				

Depending on the size, the average of RR can vary up to 1 N/kN. Standard deviation is similar, evolving from 0.2 N/kN to 0.4 N/kN

As a conclusion:

- RR average of casing must be established by size.
- The standard deviation of the most variable sizes (215/75R17.5, 315/60R22.5 & 315/70R22.5) which are major sizes (from market volume point of view), about 0.4 kg/T, can be used for all sizes, as well representing the worst case.

4.3.3. Designed tyre application impact on casing RR



The targeted application has a little or no impact on the casing rolling resistance which is coherent with common industry practices.

4.4. FAMILY OF CASING SIZES

Checking the data, it appears that certain casing sizes have similar rolling resistance average, such as:

- 385/65R22.5 and 385/55R22.5 (2 steps of aspect ratio difference) differ by 0.1
- 315/80 and 295/80 (2 steps of nominal widths) differ by less than 0.1
- 315/80 and 315/70 (2 steps of aspect ratio) differ by less than 0.1

This could help to find an efficient solution for sizes not surveyed in the design of experiment.

4.5. CONCLUSION FOR MARKET CASINGS AVERAGE AND STANDARD DEVIATION

ETRTO can propose to use the following values as market average to be used if the casing rolling resistance value is not known by the retreader:

Dimension	Market carcass rolling resistance average (RRAC)	Market carcass rolling resistance standard deviation
215/75R17.5	4.8	0.3
275/70R22.5	4.3	0.2
295/80R22.5	4.3	0.2
315/60R22.5	4.3	0.3
315/70R22.5	4.2	0.4
315/80R22.5	4.3	0.2
13R22.5	4.6	0.3
385/55R22.5	3.8	0.3
385/65R22.5	3.9	0.3
445/45R19.5	4.4	0.3

These average values have been calculated from casing rolling resistance measurement, shown in §9.2.3 “Detailed data for market casing rolling resistance". The average market carcass rolling resistance has been calculated without taking into account the market share of each casing, which is unknown.

It must be noted that these values have been established by ETRTO experiment in year 2017, and have a validity limited in time. A time frame of 4 to 6 years is strongly recommended as an interval to renew the data and calculation as above by a technical committee which has to be established, to consider the technological progress of new tyres technologies.

The standard deviation of 0.4 N/kN representing the worst case for most popular sizes can be applied to all the sizes.

5. IMPACT OF RETREADING PROCESS ON THE LABELLED TYRE PERFORMANCES

Retreaded tyres are built:

- by various sizes of companies, including small, medium and big enterprises,
- using various processes, machinery, components,
- using variable parameters, depending on regulations, on know-how and habits of retreaders, and on casing used for the retread.

ETRTO has considered it was essential to check the process parameters influence on the three performances labelled by European Union regulation 1222/2009 and/or 1235/2011.

5.1. RESULTS SUMMARY

The data show that some of the parameters used to build the retreaded tyre will impact the labelling of the retreaded tyre. However, since the parameters are chosen by the retreader, depending on his technologies, know-how and habits, the impact of the parameters on the labelling can be at least partially mastered.

Cold process	Buffing radius	Curing temperature	Curing time	Remaining rubber	Cushion gauge
Rolling resistance	medium	Low	Low	Low	Low
Sound emission	Low	Low	Low	Low	Low
Wet adherence	Low	Low	Low	Low	Low

Hot process	Buffing radius	Curing temperature	Curing time	Remaining rubber	Cushion gauge
Rolling resistance	High	High	Low	Low	Low/High[1]
Sound emission	Low	Low	Low	Low	Low
Wet adherence	Low	Low	Low	Low	Low

Note: 385/65 has low impact and 315/80 has a high impact. Reason to be confirmed

The only really impacting process parameters for rolling resistance which can be precisely measured are:

- the curing temperature for hot retread, with up to 1.5 N/kN meaning 1.5 times the width of the label class of new tyre,
- the buffing radius, especially for “narrow” tyres (315/80)

For other parameters, the impacts are low or very low, sometimes medium, especially after considering the precision of the test methods used for wet grip and rolling sound measurements. However, total impact of process, when adding the impacts, can become noticeable.

In order to be able to master the 3 labelled performances of a retreaded tyre, it will then be necessary to master the retreading parameters. This is possible for most of the parameters (curing time and temperature, cushion gauge…). However, some parameters have to be tuned depending on the casing geometry, which could require different buffing radius or remaining rubber. The mastering level of retreading process will then be lower for retreaded tyres than for new tyres.

Note:
For rolling sound performance, “low” means less than 0.5 dB(A), “medium” means less than 1 dB(A)
For wet grip, “low” means less than 5 WGI, “medium” means less than 10 WGI
For rolling resistance, “low” means less than 0.3 N/kN, “medium” means less than 0.6 N/kN

5.2. DESIGN OF EXPERIMENT DESCRIPTION

In order to understand and measure the impact of the parameters used to build a retreaded tyre on its rolling resistance, wet grip and rolling sound, which are the three performances labelled under the European Union 1222/2009 regulation, ETRTO has designed and performed a second design of experiment.

Based on each member experience, the design of experiment, run in 2015, has been set as follows:

- Five major companies participated in the study,
- The experiments were conducted on two very popular sizes
  - 315/80 R 22.5 Drive or 385/65 R 22.5 Trailer
- Five parameters have been surveyed, each of them with 2 different values:
  - Buffing radius, with values 800 and 2000mm,
  - Remaining rubber after buffing, with values 1 and 4 mm,
  - Cushion gauge, with values 1.5 and 3 mm,
  - Curing temperature, with values 95 and 125 for cold retread, 135 and 160 for hot retread
  - Curing time, with values 4 and 8 hours for cold retread, 110 and 145 minutes for hot retread
- Four repetitions were made for each experiment, 3 being measured for rolling resistance using ISO 28580 conditions, the fourth one being only use to allow wet adherence and sound emission measurements.
- The same casing (coming from new tyres of the same brand manufactured during the same period) have been used for each size,
- The same precured treads have been used for cold retreads,
- The same compound for all hot retread has been used, as well as the same mold,
- All the retreads were made in the same factory at approximately the same time
- One casing of each set was measured for RR using the ISO 28580 conditions before retreading operation
- Each set of 4 identical retreaded tyres have been measured for wet adherence and noise following the method requested by EU regulation 1222-2009

The resulting data are available in

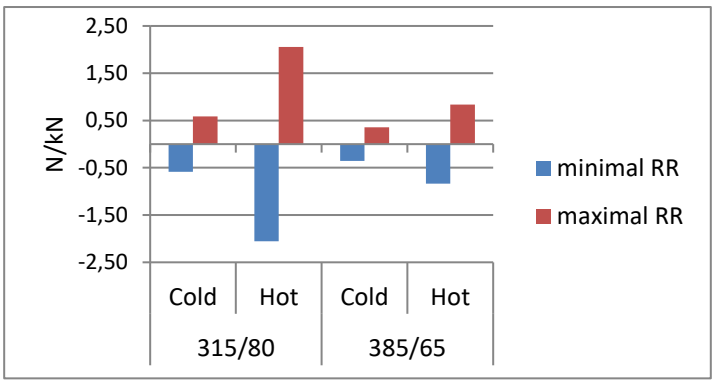
- § 9.2 Design of Experiment "Casing Average and Standard Deviation"
- § 9.4 Design of Experiment “Process Impact” data for tyre rolling sound and wet grip

5.3. DETAILED RESULTS FOR ROLLING RESISTANCE

This section will study and compare impact of all the chosen parameters.

Except for the global impact, each factor is presented with the same scale, to allow a comparison of impact.

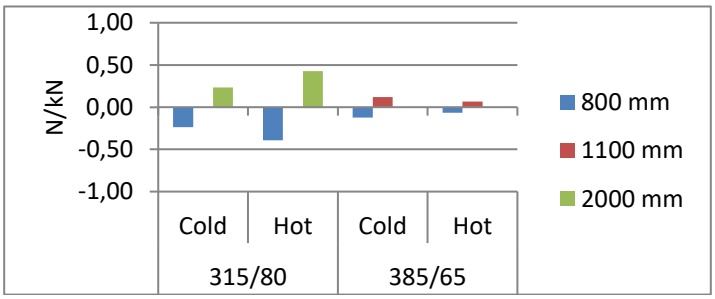
5.3.1. Global parameters impact



Globally, process parameters can change the rolling resistance value by up to 4 N/kN, which represents 4 labels.

It must be observed that new tyres have been used for retreading, in order to make sure to have identical casings. New tyre casings have usually a smaller diameter than the casings of used tyres. This implies that the rolling resistance variation when retreading worn tyres may be smaller than the variation for new tyre casings.

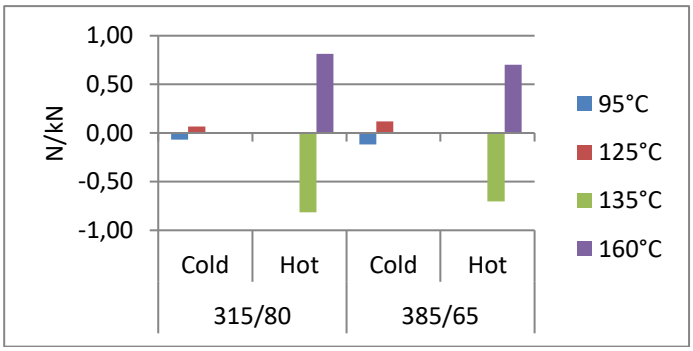
5.3.1. Buffing Radius impact



Impact of buffing radius is high.

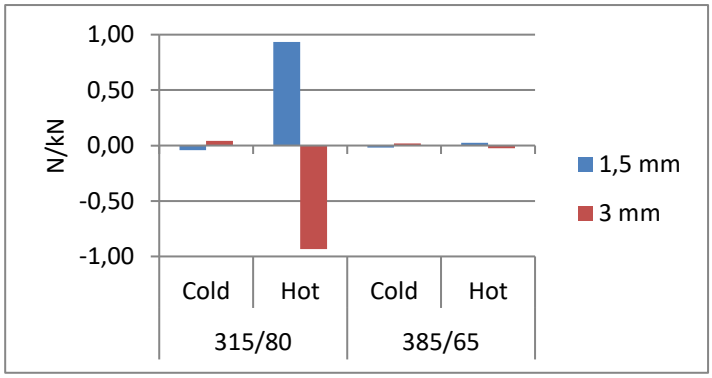
It should be noted that buffing radius has sometimes to be tuned depending on the shape of the casing. For the same process and the same component, the retreader can choose different buffing radius, depending on the casing geometry.

5.3.2. Curing temperature impact



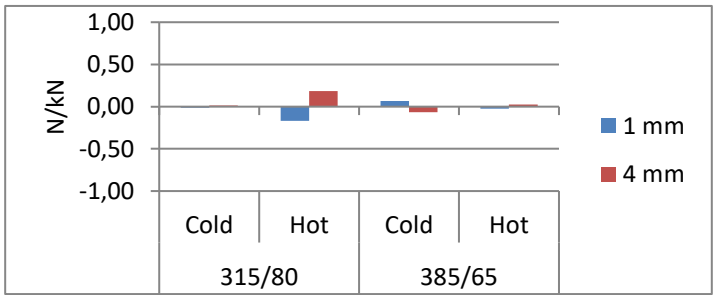
Impact of curing temperature is high for hot retread, and lower for cold retread.

5.3.3. Cushion Gauge impact



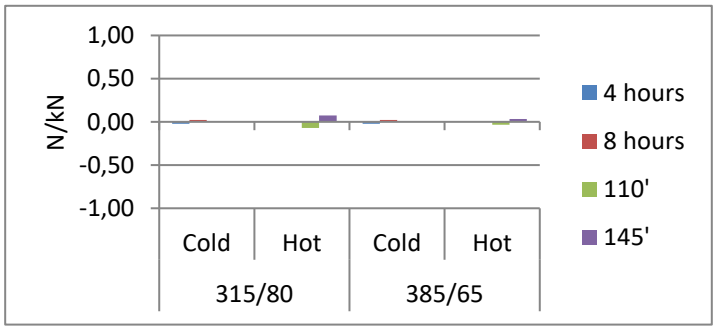
Impact of cushion gauge is low, except for 315/80R22.5 with hot retread, where the data should be further analyzed, since more rubber left surprisingly decreases the rolling resistance

5.3.4. Remaining Rubber impact



Impact of remaining rubber is low, reaching up to 0.35 N/kN for the 315/80R22.5 hot retread, but lower for other configuration

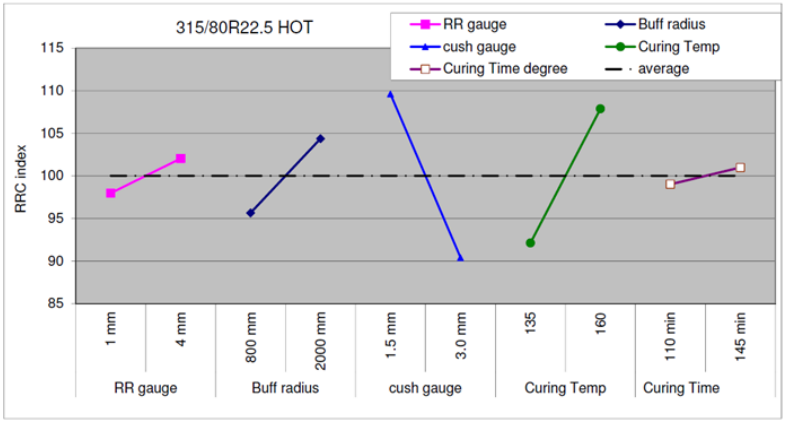
5.3.5. Curing time impact



Impact of curing temperature is high for hot retread, whatever is the size, and lower for cold retread

5.3.6. Comparison of parameters impact

5.3.6.1. 315/80R22.5 HOT retread, Taguchi method analysis

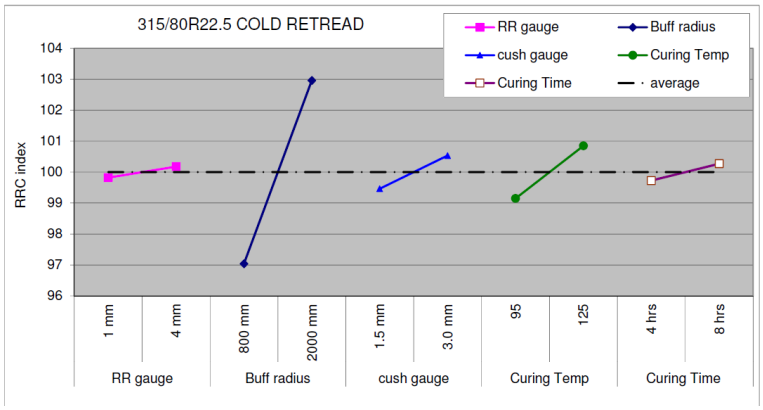


From most influent to less:

- Cushion gauge
- Curing temperature
- Buffing radius
- Remaining Rubber
- Curing time

The cushion gauge impact, indicating more rolling resistance for less material is to be further analyzed.

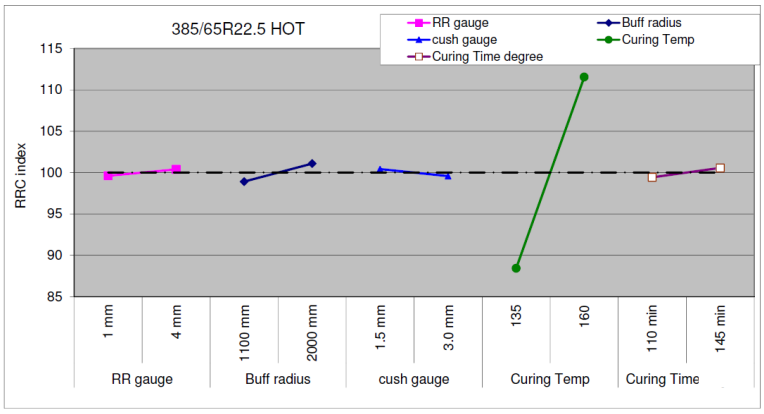
5.3.6.2. 315/80R22.5 COLD retread, Taguchi method analysis



From most influent to less:

- Buffing radius
- Curing temperature
- Cushion gauge
- Curing time
- Remaining Rubber

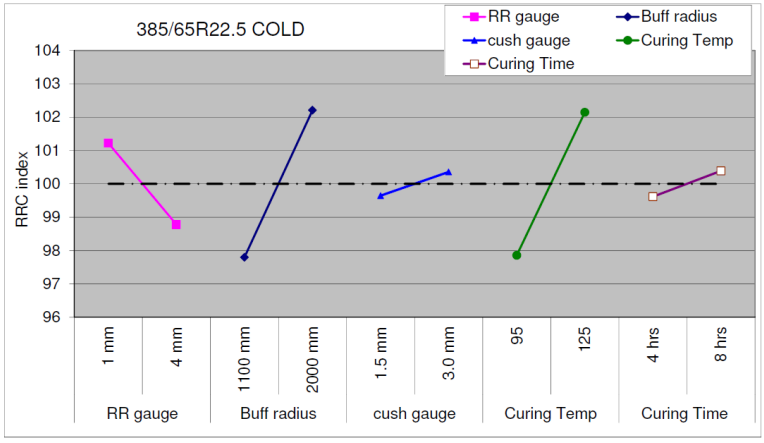
5.3.6.3. 385/65R22.5 HOT retread, Taguchi method analysis



From most influent to less:

- Curing temperature
- Buffing radius
- Curing time
- Remaining Rubber
- Cushion gauge

5.3.6.4. 385/65R22.5 COLD retread, Taguchi method analysis



From most influent to less:

- Buffing radius
- Curing temperature
- Cushion gauge
- Remaining Rubber
- Curing time

5.4. CONCLUSION ON PROCESS IMPACT ON ROLLING RESISTANCE OF RETREADED TYRE

The clearly relevant process parameters having an impact on retreaded tyre rolling resistance are **the curing temperature** of the retreaded tyre and the **buffing radius** of the casing, other parameters having less impact (cushion gauge impact for hot 315/80 to be confirmed). Other factors, globally considered, could have a noticeable impact on rolling resistance, potentially shifting the label by one class. In opposition with the casing situation, most retreading parameters can be mastered by the retreader, allowing to have a certain level of control on the rolling resistance of the retreaded tyre.

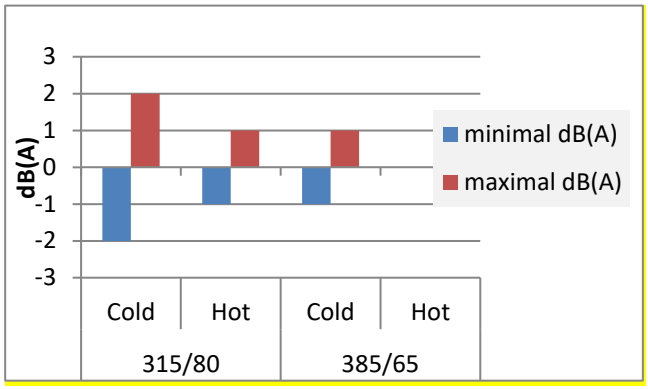
6. RETREADING PROCESS IMPACT ON RETREADED TYRE ROLLING SOUND

6.1. DETAILED RESULTS FOR RETREADED TYRE ROLLING SOUND

This section will examine then compare impact of all the chosen parameters.

All the graphs are presented with the same scale +/- 3dB(A), so that impacts can be compared. It must be observed that the tyre/road rolling sound emission measurement are always given without decimal number, linked to the measurement precision.

6.1.1. Global parameters impact

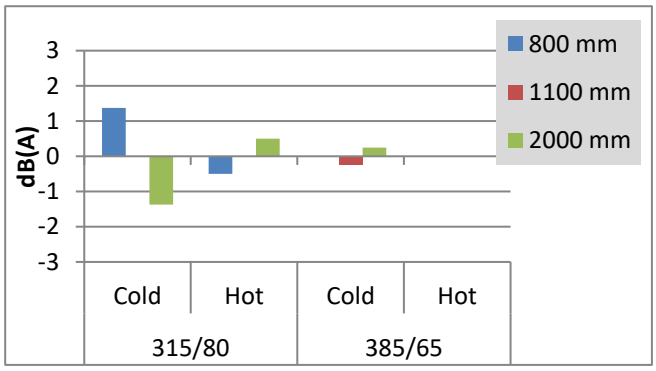


Globally, process parameters can change the rolling sound value by 4 dB(A).
However:

- considering the parameters have been chosen with values surrounding the usual parameters in order to show evidence of potential impact,
- considering the parameters can be mastered during production process,

the conclusion is that process parameters do not show a significant effect on retreaded tyres sound emission

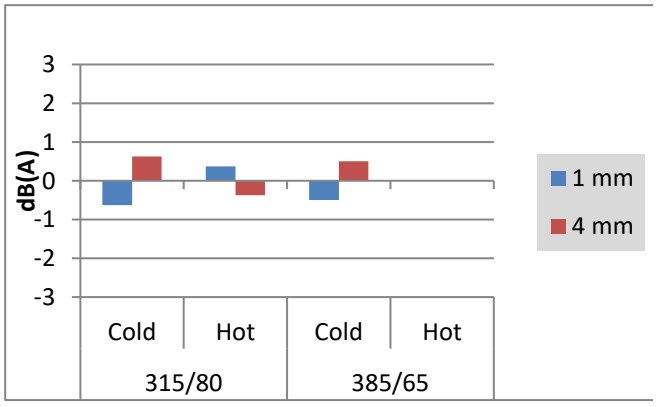
6.1.2. Buffing Radius impact



Buffing radius impact is low, but higher for the 315/80R22.5 retreaded with cold process,.

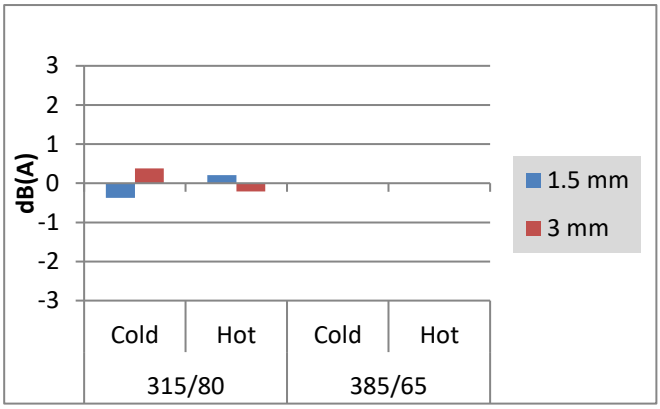
For the 315/80R22.5 Cold, the impact will be reduced by mastering process parameters.

6.1.3. Remaining Rubber impact



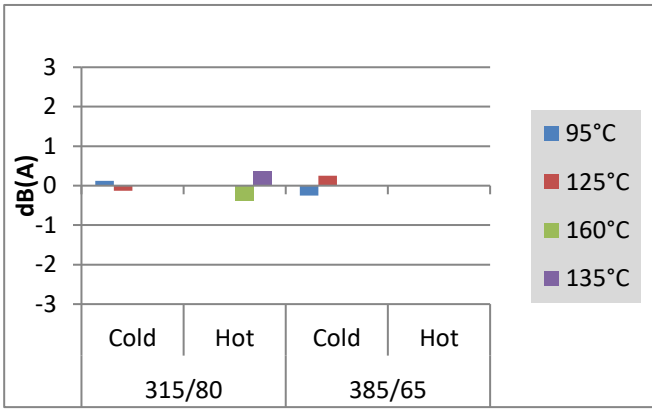
Remaining rubber impact is generally low, reaching a maximum of 1.3 dB(A) for the 315/80R22.5 cold retread.

6.1.4. Cushion Gauge impact



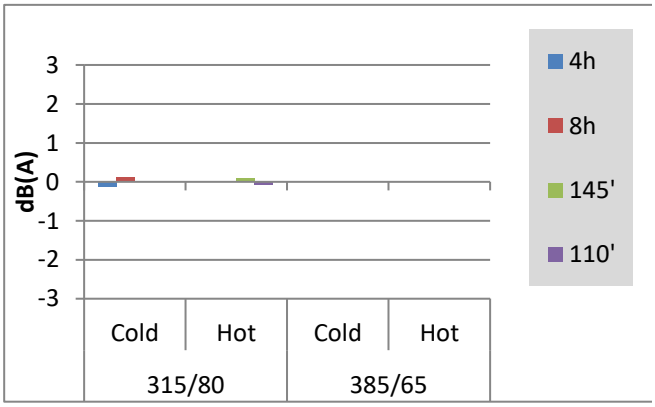
Cushion gauge impact is low

6.1.5. Curing temperature impact



Curing temperature impact is very low

6.1.6. Curing time impact



Curing time impact is very low

6.2. CONCLUSION ON PROCESS IMPACT ON SOUND EMISSION OF RETREADED TYRE

Globally, process parameters can change the sound emission value by 4 dB(A).

However, considering that:

- the chosen parameters surround the usual values, to show evidence of the impacts,
- the parameters can be mastered during production process,
- the precision of tyre rolling sound emission measurement method,

Conclusion is that process parameters do not show a significant effect on retreaded tyres rolling sound.

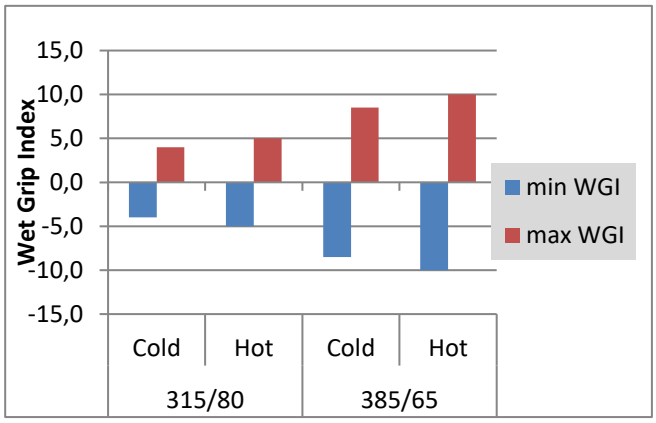
7. RETREADING PROCESS IMPACT ON RETREADED TYRE WET GRIP

7.1. DETAILED RESULTS FOR RETREADED TYRE WET GRIP

This section will examine then compare impact of all the chosen parameters.

All the graphs are presented with the same scale +/- 15 point of wet grip index, so that impacts can be compared.

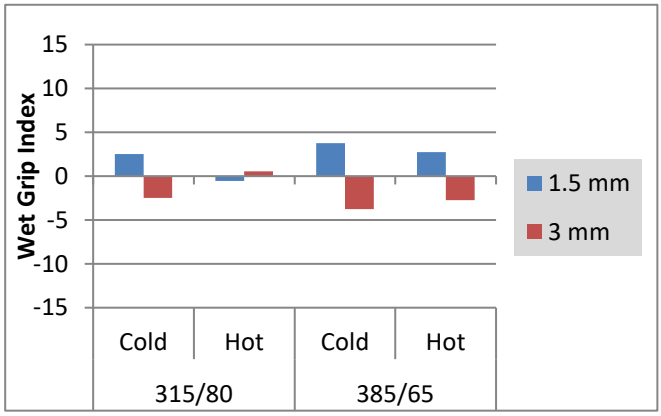
7.1.1. Global parameters impact



Globally, process parameters can change the wet grip index value by 20 points.

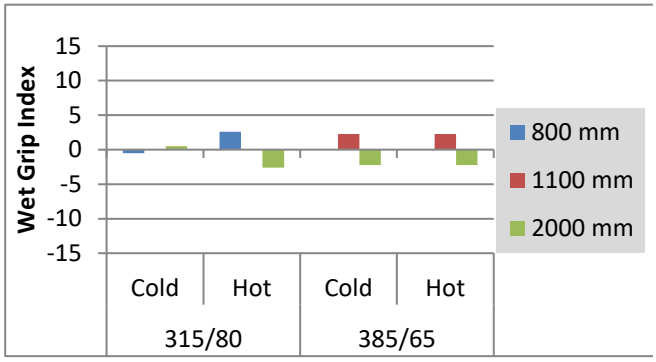
However, considering the parameters has been chosen with values surrounding the usual parameters in order to show evidence of potential impact, and considering the parameters can be mastered during production process, the conclusion is that process parameters do not show a significant effect on retreaded tyres wet grip.

7.1.1. Cushion Gauge impact



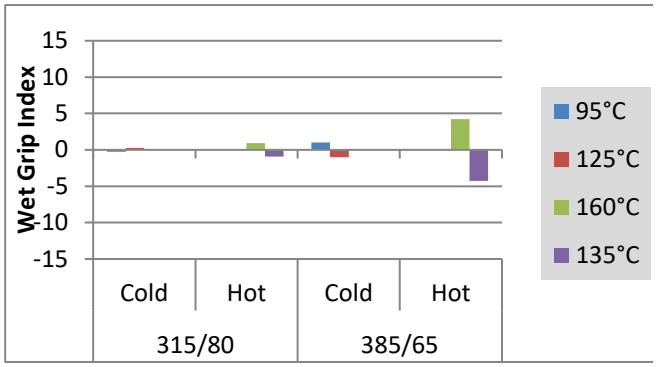
Cushion gauge impact is low.

7.1.2. Buffing Radius impact



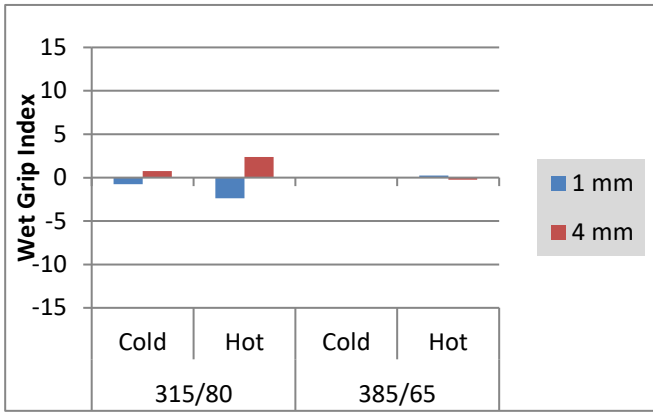
Buffing radius impact is low.

7.1.1. Curing temperature impact



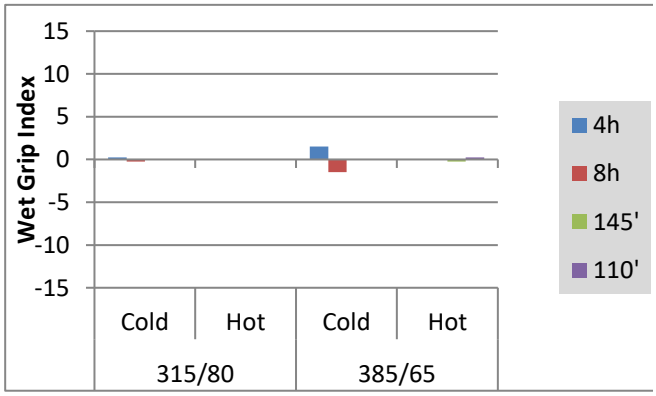
Curing temperature impact is generally low to very low

7.1.2. Remaining Rubber impact



Generally low to very low

7.1.3. Curing time impact



Generally low to very low

7.2. CONCLUSION ON PROCESS IMPACT ON WET GRIP OF RETREADED TYRE

Globally, process parameters can change wet grip index value by 20 points.

However, considering that:

- the chosen parameters surround the usual values, to show evidence of the impacts,
- the parameters can be mastered during production process,
- the precision of tyre wet grip measurement method,

conclusion is that process parameters do not show a significant effect on retreaded tyres wet grip.

8. CONCLUSIONS

8.1. CONCLUSION ON CASING IMPACT ON ROLLING RESISTANCE OF RETREADED TYRE

The ETRTO experiments data show that the casing used to build the retread tyre strongly impacts the rolling resistance of the latter, evidence being that the use of different casings while keeping the process and the material parameters constant, could lead up to 3 labels variation.

The clearly relevant factors having an impact on retreaded tyre rolling resistance are **the brand** of the casing, the casing size and the casing variability among identical casings, causing the final retreaded tyre label to spread **on at least one label and up to 4 labels**. Other factors (age, type of use, region of use and number of retreadings), individually considered, seem to have a low or non-significant impact. However, all the factors, considered together, could reach a significant level, potentially shifting a label from one class to another.

The retreader, not mastering the incoming casing rolling resistance, will not be able to master the retreaded tyre rolling resistance, unless measuring each casing, which is not industrially and economically feasible.

It will then not be possible to predict with any reasonable accuracy what will be the final class of a retreaded tyre, using the current labelling scheme.

8.2. CONCLUSION ON PROCESS IMPACT ON ROLLING RESISTANCE OF RETREADED TYRE

The clearly relevant process parameters having an impact on retreaded tyre rolling resistance are **the curing temperature** of the retreaded tyre and the **buffing radius** of the casing, Other parameters have shown to have little to no impact on rolling resistance. (cushion gauge impact for hot 315/80 to be confirmed). Other factors, globally considered, could have a noticeable impact on rolling resistance, potentially shifting the label by one class. Differences between hot and cold processes do not justify a different approach for retreaded tyres labelling. Therefore, opposite to controlling the casing situation, most retreading parameters can and should be mastered by the retreader, allowing having a certain level of control on the rolling resistance of the retreaded tyre.

8.3. CONCLUSION ON PROCESS IMPACT ON ROLLING SOUND OF RETREADED TYRE

Globally, process parameters can change the sound emission value by 4 dB(A). However, considering that the parameters relevant to the retread process (to show evidence of the impacts) can be mastered during production process and the precision of tyre rolling sound emission measurement method, the conclusion is that process parameters do not show a significant effect on retreaded tyres rolling sound.

8.4. CONCLUSION ON PROCESS IMPACT ON WET GRIP OF RETREADED TYRE

Globally, process parameters can change wet grip index value by 20 points. However, considering that the parameters relevant to the retread process can be mastered during production process and the today setup of tyre wet grip measurement method, the conclusion is that process parameters do not show a significant effect on retreaded tyres wet grip.

8.5. CONCLUSION ON LABEL FEASIBILITY

With regards to wet grip and rolling sound, the experiment has proven that the manufacturing process impacts, hence being noticeable, should most probably be mastered by retread industry, in a manner which could be sustainable, applying the current labelling scheme for C3 tyres.

With regards to rolling resistance, the experiments have proven that casing impact and manufacturing process have a big impact, which can be partially mastered for manufacturing process, but cannot be mastered for the casing impact. Therefore, with current retreading operations, rolling resistance retreading labelling scheme same as new tyre is not feasible, unless every single retreaded tyres is tested individually, which is not sustainable for the retreading industry.

9. ANNEX

9.1. DESIGN OF EXPERIMENT "CASING IMPACT" DATA

Size	Retread Type	DOE. Nr	Casing #	Id. nr.	Brand code	Use	Area	Retread(s)	AgeType	DOT	RRC casing (N/kN)	RRC tire (N/kN)
315/80	COLD	2	1	A2-1	B	LH	N	1	<= 3 years	3710	**3,86**	**7,28**
315/80	COLD	2	2	A2-2	B	LH	N	1	<= 3 years	1111		**7,31**
315/80	COLD	2	3	A2-3	B	LH	N	1	<= 3 years	111		**7,50**
315/80	COLD	4	1	A4-1	B	RH	S	1	<= 3 years	4110	**3,55**	**7,36**
315/80	COLD	4	2	A4-2	B	RH	S	1	<= 3 years	4010		**7,40**
315/80	COLD	4	3	A4-3	B	RH	S	1	<= 3 years	4110		**7,38**
315/80	COLD	5	1	A5-1	B	LH	S	0	<= 3 years	3710	**3,76**	**7,22**
315/80	COLD	5	2	A5-2	B	LH	S	0	<= 3 years	3810		**7,17**
315/80	COLD	5	3	A5-3	B	LH	S	0	<= 3 years	3610		**7,47**
315/80	COLD	7	1	A7-1	B	RH	N	0	>= 5 years	3208	**4,01**	**7,47**
315/80	COLD	7	2	A7-2	B	RH	N	0	>= 5 years	3308		**7,43**
315/80	COLD	7	3	A7-3	B	RH	N	0	>= 5 years	3308		**7,40**
315/80	COLD	2	1	B2-1	C	LH	N	1	<= 3 years	5009	**4,82**	**7,87**
315/80	COLD	2	2	B2-2	C	LH	N	1	<= 3 years	1810		**7,95**
315/80	COLD	2	3	B2-3	C	LH	N	1	<= 3 years	1910		**7,95**
315/80	COLD	4	1	B4-1	C	RH	S	1	<= 3 years	3010	**4,71**	**8,27**
315/80	COLD	4	2	B4-2	C	RH	S	1	<= 3 years	5110		**7,84**
315/80	COLD	4	3	B4-3	C	RH	S	1	<= 3 years	710		**8,00**
315/80	COLD	5	1	B5-1	C	LH	S	0	>= 5 years	4907	**4,37**	**7,61**
315/80	COLD	5	2	B5-2	C	LH	S	0	>= 5 years	3807		**7,88**
315/80	COLD	5	3	B5-3	C	LH	S	0	>= 5 years	4907		**7,64**
315/80	COLD	7	1	B7-1	C	RH	N	0	>= 5 years	4807	**4,46**	**7,63**
315/80	COLD	7	2	B7-2	C	RH	N	0	>= 5 years	307		**7,69**
315/80	COLD	7	3	B7-3	C	RH	N	0	>= 5 years	4707		**7,80**
315/80	COLD	2	1	C2-1	D	LH	N	1	<= 3 years	2111	**4,51**	**7,62**
315/80	COLD	2	2	C2-2	D	LH	N	1	<= 3 years	4510		**8,00**
315/80	COLD	2	3	C2-3	D	LH	N	1	<= 3 years	3310		**7,64**
315/80	COLD	4	1	C4-1	D	RH	S	1	>= 5 years	3308	**4,91**	**7,80**
315/80	COLD	4	3	C4-3	D	RH	S	1	>= 5 years	4208		**7,71**
315/80	COLD	5	2	C5-2	D	LH	S	0	>= 5 years	407	**4,40**	**7,60**
315/80	COLD	5	3	C5-3	D	LH	S	0	>= 5 years	3407		**8,33**
315/80	COLD	5	1	C5-1	D	LH	S	0	>= 5 years	3906		**7,77**
315/80	COLD	7	1	C7-1	D	RH	N	0	>= 5 years	3207	**4,33**	**7,50**
315/80	COLD	7	2	C7-2	D	RH	N	0	>= 5 years	3607		**7,33**
315/80	COLD	7	3	C7-3	D	RH	N	0	>= 5 years	1107		**7,41**
315/80	COLD	2	1	D2-1	A	LH	N	1	<= 3 years	2811	**3,65**	**7,10**
315/80	COLD	2	2	D2-2	A	LH	N	1	<= 3 years	2210		**7,29**
315/80	COLD	2	3	D2-3	A	LH	N	1	<= 3 years	4609		**7,19**
315/80	COLD	4	1	D4-1	A	RH	S	1	<= 3 years	711	**3,75**	**7,30**
315/80	COLD	4	2	D4-2	A	RH	S	1	<= 3 years	2511		**7,07**
315/80	COLD	4	3	D4-3	A	RH	S	1	<= 3 years	3810		**7,39**
315/80	COLD	5	1	D5-1	A	LH	S	0	>= 5 years	2106	**4,11**	**7,51**
315/80	COLD	5	3	D5-3	A	LH	S	0	>= 5 years	1307		**7,47**
315/80	COLD	5	2	D5-2	A	LH	S	0	<= 3 years	711		**7,13**
315/80	COLD	7	1	D7-1	A	RH	N	0	>= 5 years	3406	**4,17**	**7,47**
315/80	COLD	7	2	D7-2	A	RH	N	0	>= 5 years	907		**7,66**
315/80	COLD	7	3	D7-3	A	RH	N	0	>= 5 years	708		**7,18**

Size	Retread Type	DOE. Nr	Casing #	Id. nr.	Brand code	Use	Area	Retread(s)	AgeType	DOT	**RRC casing (N/kN)**	**RRC tire (N/kN)**
315/80	HOT	1	1	B1-1	C	LH	N	0	<= 3 years	4709	**3,57**	**8,04**
315/80	HOT	1	2	B1-2	C	LH	N	0	>= 5 years	709		**8,05**
315/80	HOT	1	3	B1-3	C	LH	N	0	<= 3 years	4709		**8,19**
315/80	HOT	3	1	B3-1	C	RH	S	0	>= 5 years	1709	**3,67**	**8,31**
315/80	HOT	3	2	B3-2	C	RH	S	0	>= 5 years	1709		**8,14**
315/80	HOT	3	3	B3-3	C	RH	S	0	>= 5 years	1609		**8,46**
315/80	HOT	6	1	B6-1	C	LH	S	1	>= 5 years	209	**4,04**	**8,49**
315/80	HOT	6	2	B6-2	C	LH	S	1	<= 3 years	1810		**8,22**
315/80	HOT	6	3	B6-3	C	LH	S	1	<= 3 years	1710		**8,44**
315/80	HOT	8	1	B8-1	C	RH	N	1	<= 3 years	1510	**4,12**	**8,20**
315/80	HOT	8	2	B8-2	C	RH	N	1	<= 3 years	911		**7,80**
315/80	HOT	8	3	B8-3	C	RH	N	1	<= 3 years	911		**8,14**
315/80	HOT	1	1	C1-1	D	LH	N	0	<= 3 years	2710	**3,74**	**7,99**
315/80	HOT	1	2	C1-2	D	LH	N	0	<= 3 years	3509		**8,59**
315/80	HOT	1	3	C1-3	D	LH	N	0	<= 3 years	2410		**7,90**
315/80	HOT	3	1	C3-1	D	RH	S	0	<= 3 years	711	**3,51**	**8,03**
315/80	HOT	3	2	C3-2	D	RH	S	0	<= 3 years	1011		**8,09**
315/80	HOT	3	3	C3-3	D	RH	S	0	<= 3 years	2410		**8,23**
315/80	HOT	6	1	C6-1	D	LH	S	1	<= 3 years	4809	**4,15**	**8,49**
315/80	HOT	6	2	C6-2	D	LH	S	1	<= 3 years	2510		**8,34**
315/80	HOT	6	3	C6-3	D	LH	S	1	<= 3 years	2110		**8,42**
315/80	HOT	8	1	C8-1	D	RH	N	1	>= 5 years	2107	**4,25**	**8,43**
315/80	HOT	8	2	C8-2	D	RH	N	1	>= 5 years	2507		**8,34**
315/80	HOT	8	3	C8-3	D	RH	N	1	>= 5 years	3506		**8,40**
315/80	HOT	1	1	D1-1	A	LH	N	0	<= 3 years	3010	**3,62**	**8,18**
315/80	HOT	1	2	D1-2	A	LH	N	0	<= 3 years	4510		**8,04**
315/80	HOT	1	3	D1-3	A	LH	N	0	<= 3 years	2411		**7,75**
315/80	HOT	3	1	D3-1	A	RH	S	0	<= 3 years	2811	**3,31**	**8,06**
315/80	HOT	3	2	D3-2	A	RH	S	0	<= 3 years	4710		**8,02**
315/80	HOT	3	3	D3-3	A	RH	S	0	<= 3 years	4710		**8,13**
315/80	HOT	6	1	D6-1	A	LH	S	1	>= 5 years	4606	**4,22**	**8,21**
315/80	HOT	6	3	D6-3	A	LH	S	1	>= 5 years	4108		**8,21**
315/80	HOT	6	2	D6-2	A	LH	S	1	>= 5 years	2507		**8,31**
315/80	HOT	8	1	D8-1	A	RH	N	1	>= 5 years	1707	**3,69**	**8,06**
315/80	HOT	8	2	D8-2	A	RH	N	1	<= 3 years	3409		**8,05**
315/80	HOT	8	3	D8-3	A	RH	N	1	>= 5 years	4406		**8,25**

Size	Retread Type	DOE. Nr	Casing #	Id. nr.	Brand code	Use	Area	Retread(s)	AgeType	DOT	RRC casing (N/kN)	RRC tire (N/kN)
385/65	COLD	2	1	A2-1	B	LH	N	1	<= 3 years	4509	**3,39**	**5,50**
385/65	COLD	2	2	A2-2	B	LH	N	1	<= 3 years	4409		**5,51**
385/65	COLD	2	3	A2-3	B	LH	N	1	<= 3 years	2411		**5,56**
385/65	COLD	4	1	A4-1	B	RH	S	1	<= 3 years	311	**3,33**	**5,60**
385/65	COLD	4	2	A4-2	B	RH	S	1	<= 3 years	3411		**5,59**
385/65	COLD	4	3	A4-3	B	RH	S	1	<= 3 years	310		**5,49**
385/65	COLD	5	1	A5-1	B	LH	S	0	>= 5 years	3107	**3,42**	**5,60**
385/65	COLD	5	2	A5-2	B	LH	S	0	>= 5 years	4607		**5,51**
385/65	COLD	5	3	A5-3	B	LH	S	0	>= 5 years	4107		**5,54**
385/65	COLD	7	1	A7-1	B	RH	N	0	>= 5 years	4108	**3,49**	**5,49**
385/65	COLD	7	2	A7-2	B	RH	N	0	>= 5 years	1508		**5,47**
385/65	COLD	7	3	A7-3	B	RH	N	0	>= 5 years	3608		**5,44**
385/65	COLD	2	1	B2-1	C	LH	N	1	>= 5 years	3508	**3,57**	**5,43**
385/65	COLD	2	2	B2-2	C	LH	N	1	<= 3 years	1011		**5,84**
385/65	COLD	2	3	B2-3	C	LH	N	1	>= 5 years	2007		**5,64**
385/65	COLD	4	1	B4-1	C	RH	S	1	<= 3 years	4809	**3,71**	**5,61**
385/65	COLD	4	2	B4-2	C	RH	S	1	<= 3 years	3810		**5,61**
385/65	COLD	4	3	B4-3	C	RH	S	1	<= 3 years	4010		**5,87**
385/65	COLD	5	1	B5-1	C	LH	S	0	>= 5 years	4906	**3,72**	**5,50**
385/65	COLD	5	2	B5-2	C	LH	S	0	>= 5 years	4607		**5,65**
385/65	COLD	5	3	B5-3	C	LH	S	0	>= 5 years	4805		**5,66**
385/65	COLD	7	1	B7-1	C	RH	N	0	>= 5 years	3007	**3,88**	**5,59**
385/65	COLD	7	2	B7-2	C	RH	N	0	>= 5 years	1306		**5,67**
385/65	COLD	7	3	B7-3	C	RH	N	0	>= 5 years	1707		**5,91**
385/65	COLD	2	1	C2-1	D	LH	N	1	<= 3 years	2910	**3,82**	**5,56**
385/65	COLD	2	2	C2-2	D	LH	N	1	<= 3 years	2911		**5,62**
385/65	COLD	2	3	C2-3	D	LH	N	1	<= 3 years	3310		**5,63**
385/65	COLD	4	1	C4-1	D	LH	S	1	<= 3 years	2111	**3,52**	**5,49**
385/65	COLD	4	2	C4-2	D	RH	S	1	<= 3 years	5211		**5,59**
385/65	COLD	4	3	C4-3	D	RH	S	1	<= 3 years	4610		**5,65**
385/65	COLD	5	1	C5-1	D	LH	S	0	>= 5 years	4807	**3,47**	**5,51**
385/65	COLD	5	2	C5-2	D	LH	S	0	>= 5 years	3207		**5,36**
385/65	COLD	5	3	C5-3	D	LH	S	0	>= 5 years	207		**5,39**
385/65	COLD	7	1	C7-1	D	RH	N	0	>= 5 years	4907	**3,44**	**5,45**
385/65	COLD	7	2	C7-2	D	RH	N	0	>= 5 years	3807		**5,41**
385/65	COLD	7	3	C7-3	D	RH	N	0	>= 5 years	1607		**5,43**
385/65	COLD	2	1	D2-1	A	LH	N	1	<= 3 years	4309	**3,45**	**5,36**
385/65	COLD	2	2	D2-2	A	LH	N	1	<= 3 years	410		**5,32**
385/65	COLD	2	3	D2-3	A	LH	N	1	<= 3 years	911		**5,43**
385/65	COLD	4	1	D4-1	A	RH	S	1	<= 3 years	511	**3,34**	**5,37**
385/65	COLD	4	2	D4-2	A	RH	S	1	<= 3 years	4009		**5,41**
385/65	COLD	4	3	D4-3	A	RH	S	1	>= 5 years	909		**5,40**
385/65	COLD	5	1	D5-1	A	LH	S	0	>= 5 years	3307	**3,95**	**5,60**
385/65	COLD	5	2	D5-2	A	LH	S	0	>= 5 years	4508		**5,48**
385/65	COLD	5	3	D5-3	A	LH	S	0	<= 3 years	2510		**5,41**
385/65	COLD	7	1	D7-1	A	RH	N	0	<= 3 years	4510	**3,46**	**5,34**
385/65	COLD	7	2	D7-2	A	RH	N	0	<= 3 years	211		**5,18**
385/65	COLD	7	3	D7-3	A	RH	N	0	<= 3 years	1911		**5,39**

Size	Retread Type	DOE. Nr	Casing #	Id. nr.	Brand code	Use	Area	Retread(s)	AgeType	DOT	RRC casing (N/kN)	RRC tire (N/kN)
385/65	HOT	1	1	B1-1	C	LH	N	0	<= 3 years	2810	**3,20**	**5,79**
385/65	HOT	1	2	B1-2	C	LH	N	0	<= 3 years	1010		**5,75**
385/65	HOT	1	3	B1-3	C	LH	N	0	<= 3 years	5010		**5,78**
385/65	HOT	3	1	B3-1	C	RH	S	0	<= 3 years	4110	**3,72**	**5,94**
385/65	HOT	3	2	B3-2	C	RH	S	0	<= 3 years	711		**6,10**
385/65	HOT	3	3	B3-3	C	RH	S	0	>= 5 years	1409		**5,95**
385/65	HOT	6	1	B6-1	C	LH	S	1	>= 5 years	2007	**3,91**	**5,93**
385/65	HOT	6	2	B6-2	C	LH	S	1	<= 3 years	4610		**5,49**
385/65	HOT	6	3	B6-3	C	LH	S	1	>= 5 years	2007		**6,17**
385/65	HOT	8	1	B8-1	C	RH	N	1	<= 3 years	1210	**3,99**	**6,01**
385/65	HOT	8	2	B8-2	C	RH	N	1	>= 5 years	608		**6,14**
385/65	HOT	8	3	B8-3	C	RH	N	1	>= 5 years	2407		**6,03**
385/65	HOT	1	2	C1-2	D	LH	N	0	<= 3 years	4310		**5,16**
385/65	HOT	1	3	C1-3	D	LH	N	0	<= 3 years	2010		**5,28**
385/65	HOT	1	1	C1-1	D	LH	N	0	<= 3 years	4710	**3,04**	**5,13**
385/65	HOT	3	1	C3-1	D	RH	S	0	<= 3 years	510	**3,36**	**5,28**
385/65	HOT	3	2	C3-2	D	RH	S	0	<= 3 years	910		**5,5**
385/65	HOT	3	3	C3-3	D	RH	S	0	<= 3 years	4210		**5,3**
385/65	HOT	6	1	C6-1	D	LH	S	1	<= 3 years	3710	**3,46**	**5,42**
385/65	HOT	6	2	C6-2	D	LH	S	1	<= 3 years	4910		**5,68**
385/65	HOT	6	3	C6-3	D	LH	S	1	<= 3 years	910		**5,39**
385/65	HOT	8	1	C8-1	D	RH	N	1	<= 3 years	4109	**3,41**	**5,36**
385/65	HOT	8	2	C8-2	D	RH	N	1	<= 3 years	4109		**5,56**
385/65	HOT	8	3	C8-3	D	RH	N	1	<= 3 years	910		**5,4**
385/65	HOT	1	1	D1-1	A	LH	N	0	<= 3 years	1111	**2,99**	**5,53**
385/65	HOT	1	2	D1-2	A	LH	N	0	<= 3 years	1711		**5,74**
385/65	HOT	1	3	D1-3	A	LH	N	0	<= 3 years	1211		**5,63**
385/65	HOT	3	1	D3-1	A	RH	S	0	<= 3 years	3109	**3,31**	**5,72**
385/65	HOT	3	2	D3-2	A	RH	S	0	>= 5 years	2908		**5,8**
385/65	HOT	3	3	D3-3	A	RH	S	0	<= 3 years	3509		**5,75**
385/65	HOT	6	1	D6-1	A	LH	S	1	<= 3 years	1010	**3,11**	**5,53**
385/65	HOT	6	2	D6-2	A	LH	S	1	<= 3 years	211		**5,78**
385/65	HOT	6	3	D6-3	A	LH	S	1	<= 3 years	3509		**5,68**
385/65	HOT	8	2	D8-2	A	RH	N	1	>= 5 years	3007		**5,87**
385/65	HOT	8	3	D8-3	A	RH	N	1	>= 5 years	3608		**5,85**
385/65	HOT	8	1	D8-1	A	RH	N	1	<= 3 years	5009	**3,30**	**5,66**

Use: LH/RH : Long Haul / Regional Haul

Area: N/S : North/South

AgeType : casing age

DOT : 1 or 2 first digit represent the week, 2 last digit represent the year of manufacturing.

9.2. DESIGN OF EXPERIMENT "CASING AVERAGE AND STANDARD DEVIATION"

ETRTO has selected casings representing the market as following:

- 9 brands of casings, representative of European market, including:
  - 5 brands of the ETRTO Task Force members financing the project. These brands are Bridgestone, Continental, Goodyear, Michelin and Pirelli.
  - 4 brands, non-members of the ETRTO Task Force, coming from a different continent. These brands are Aeolus, Double Coin, Giti and Hankook.
- 4 usages, which are Long Haul, Regional, On/Off road and Urban application.
- 10 sizes representing about 90% of new tyre market and about 95% of retreaded tyres market (source ETRMA pool and Bipaver estimation)

423 casings have then been searched, 382 have been found, and 361 could be measured.

9.2.1. Tables of sizes, usage, number of companies and number of selected casing

Casings to search from the casing supplier:

SIZES	LONG HAUL	REGIONAL/	URBAN	ON/OFF	COMMENT
385/65 R22.5	YES	YES		YES	Mainly trailer
315/80 R22.5	YES	YES		YES	
295/80 R22.5	YES	YES		YES	
315/70 R22.5	YES	YES			
385/55 R22.5	YES	YES			Mainly trailer
13 R22.5				YES	
275/70 R22.5			YES		
215/75 R17.5		YES			Drive and trailer
315/60 R22.5	YES		*YES(*)*		
445/45 R19.5	YES				Only trailer

(*)315/60R22.5 casing for urban application have been looked for but could not be found by the casing collector.

Number of casings found and measured per size and usage:

Size	LONG HAUL	REGIONAL	URBAN	ON/OFF	Total
385/65R22.5	26	27		19	**72**
315/80R22.5	20	22		26	**68**
295/80R22.5	24	27		3	**54**
315/70R22.5	25	26			**51**
385/55R22.5	17	18			**35**
13R22.5				21	**21**
275/70R22.5			19		**19**
215/75R17.5		18			**18**
315/60R22.5	17				**17**
445/45R19.5	6				**6**
Total	**135**	**138**	**19**	**69**	**361**

Number of brands per size and usage:

Size Usage	LONG HAUL	REGIONAL	URBAN	ON/OFF
385/65R22.5	9	9		8
315/80R22.5	8	8		9
295/80R22.5	8	8		1
315/70R22.5	9	9		
385/55R22.5	6	6		6
13R22.5				**8**
275/70R22.5			7	
215/75R17.5		6		
315/60R22.5	6			
445/45R19.5	2			

9.2.2. European new tyre market data 2016, provided by ETRMA pool

Size	2016 Market size	Tested	Market weight	Cumulated market
385/65 R 22.5	4 971 978	1	41.75%	41.7%
315/80 R 22.5	2 065 836	1	17.35%	59.1%
315/70 R 22.5	1 162 962	1	9.76%	68.9%
295/80 R 22.5	800 667	1	6.72%	75.6%
385/55 R 22.5	617 231	1	5.18%	80.8%
215/75 R 17.5	465 711	1	3.91%	84.7%
13/NA R 22.5	174 189	1	1.46%	86.1%
275/70 R 22.5	167 084	1	1.40%	87.5%
315/60 R 22.5	145 066	1	1.22%	88.8%
445/45 R 19.5	53 253	1	0.45%	89.2%
265/70 R 19.5	463 306	0	3.89%	93.1%
235/75 R 17.5	329 927	0	2.77%	95.9%
245/70 R 17.5	275 749	0	2.32%	98.2%
435/50 R 19.5	74 087	0	0.62%	98.8%
205/65 R 17.5	34 859	0	0.29%	99.1%
285/70 R 19.5	32 333	0	0.27%	99.4%
9.5/NA R 17.5	28 291	0	0.24%	99.6%
245/70 R 19.5	26 198	0	0.22%	99.8%
425/65 R 22.5	18 216	0	0.15%	100.0%
8.25/NA - 20	3 321	0	0.03%	100.0%

ETRTO design of experiment has covered about **90%** of the new tyre market.

An additional survey on **4 sizes** (265/70R19.5, 235/75R17.5, 245/70R19.5 and 435/50R19.5) would allow covering about **99%** of the new market, representing most probably an higher part of retreaded tyre market.

9.2.3. Detailed data for market casing rolling resistance

Brand	Size	Use	DOT WY	LI/SI	MS	TD1	TD Center	TD2	Bead width	Buffing Radius	Buffing Circonf.	Rdepth1	Rdepth Center	Rdepth2	Patch present (N/Y)	Buffed tyre weigh	RRAC Casing (N/kN)
2	385/65R22.5	REGIONAL	3112	160K	N	5	4	4	11.75	1 500	3 295	2	3	2.2	N	56.0	3.96
2	385/65R22.5	REGIONAL	2013	160K	N	4	3	3	11.75	1 500	3 277	1.5	3	1.5	N	55.0	3.92
2	385/65R22.5	REGIONAL	3412	160K	N	5	4	4	11.75	1 500	3 277	1.5	3	1	N	56.0	4.10
2	385/65R22.5	ON/OFF	3816	160K	Y	5	5	5	11.75	1 200	3 266	4	3	3	N	54.0	3.36
2	385/65R22.5	ON/OFF	3416	160K	Y	5	5	5	11.75	1 200	3 267	3.2	2.5	3.2	N	54.0	3.45
3	385/65R22.5	LONG HAUL	4314	160K	N	4	5	5	11.75	1 500	3 228	2.5	3	2.5	N	53.5	3.76
3	385/65R22.5	LONG HAUL	0815	160K	N	5	6	6	11.75	1 500	3 226	2.7	3	2.2	N	53.5	3.66
3	385/65R22.5	LONG HAUL	2015	160K	N	5	5	5	11.75	1 500	3 226	2.5	3	2.5	N	54.0	3.70
3	385/65R22.5	REGIONAL	4015	160K	Y	4	4	3	11.75	1 500	3 230	2.5	3	2.8	N	54.5	3.87
3	385/65R22.5	REGIONAL	4415	160K	Y	5	5	4	11.75	1 500	3 224	3	3	3	N	55.0	3.94
3	385/65R22.5	REGIONAL	4515	160K	Y	4	3	4	11.75	1 500	3 227	2.5	2.5	2.8	N	55.5	3.94
3	385/65R22.5	ON/OFF	1013	160K	Y	3	5	3	11.75	1 500	3 229	3	3	2.5	N	56.0	4.15
3	385/65R22.5	ON/OFF	0915	160K	Y	4	3	5	11.75	1 500	3 227	3	2.9	3.5	N	57.0	3.93
5	385/65R22.5	LONG HAUL	1914	160K	N	2	3	2	11.75	1 500	3 264	1.8	3	2.5	N	51.0	3.77
5	385/65R22.5	LONG HAUL	1115	160K	N	4	5	5	11.75	1 500	3 261	1.8	3	2	N	50.5	3.83
5	385/65R22.5	LONG HAUL	3714	160K	N	4	4	5	11.75	1 500	3 255	1.6	2.5	1	N	50.0	3.90
5	385/65R22.5	REGIONAL	3814	160K	N	5	4	5	11.75	1 500	3 263	2	3	2.2	N	51.0	3.97
5	385/65R22.5	REGIONAL	3913	160K	N	5	5	2	11.75	1 500	3 268	2	3	2	N	48.5	3.95
5	385/65R22.5	REGIONAL	4413	160K	N	4	2	4	11.75	1 500	3 257	2	3	1.5	N	51.0	4.01
5	385/65R22.5	ON/OFF	2316	160K	Y	6	5	6	11.75	1 700	3 258	3	3	3	N	51.5	3.91
5	385/65R22.5	ON/OFF	3915	160K	Y	5	5	5	11.75	1 700	3 263	3	3	2	N	51.5	3.63
8	385/65R22.5	LONG HAUL	2915	160K	N	3	2	3	11.75	1 500	3 247	3.5	3	3	N	57.0	3.72
8	385/65R22.5	LONG HAUL	0915	160K	N	3	2	3	11.75	1 500	3 246	2	2.8	2	N	56.0	3.60
8	385/65R22.5	LONG HAUL	3115	160K	N	3	2	3	11.75	1 500	3 246	3.6	3	3.5	N	56.5	3.81
8	385/65R22.5	REGIONAL	1316	160K	Y	5	4	6	11.75	1 500	3 246	2	2.5	2	N	56.0	3.96
8	385/65R22.5	REGIONAL	2115	160K	Y	5	5	4	11.75	1 500	3 245	1.2	2.5	1.2	N	55.0	3.82
8	385/65R22.5	REGIONAL	4315	160K	Y	5	4	3	11.75	1 500	3 247	3	2.5	3	N	57.0	3.93
8	385/65R22.5	ON/OFF	1015	160K	Y	4	5	5	11.75	1 500	3 254	2.5	2.8	2.5	N	62.5	4.04
8	385/65R22.5	ON/OFF	3216	160K	Y	2	4	4	11.75	1 500	3 253	2	2.5	2	N	61	3.96
8	385/65R22.5	ON/OFF	3712	160K	Y	5	5	5	11.75	1 500	3 254	2.5	3	2.5	N	62	4.21
9	385/65R22.5	LONG HAUL	1915	158L	N	5	6	5	11.75	1 500	3 265	3	3	3	Y	60.5	3.52
9	385/65R22.5	LONG HAUL	4716	158L	N	5	5	5	11.75	1 500	3 252	2	3	2	N	60	3.65
9	385/65R22.5	LONG HAUL	2314	158L	N	6	5	§	11.75	1 500	3 262	2.3	3	2.5	N	59.5	3.65
9	385/65R22.5	REGIONAL	1715	160K	Y	6	5	5	11.75	1 500	3 258	3	3	2.5	N	59.5	3.42
9	385/65R22.5	REGIONAL	4914	160K	Y	3	4	5	11.75	1 500	3 261	3	3	3	N	59.5	3.51
9	385/65R22.5	REGIONAL	2215	160K	Y	5	3	3	11.75	1 500	3 257	3	3	3.5	N	59.5	3.69
2	385/65R22.5	LONG HAUL	4416	160K	Y	14	14	14		1 500	3 278	2.5	3	3	N	57.0	3.50
2	385/65R22.5	LONG HAUL	4416	160K	Y	14	14	14		1 500	3 280	3	3	3	N	57.0	3.51
2	385/65R22.5	LONG HAUL	0916	160K	N	6	7	6		1 500	3 280	2.2	3	2.2	N	55.0	3.68
9	385/65R22.5	ON/OFF	0414	160K	Y	2	4	3	11.75	1 500	3 257	2.5	3	3	N	58.5	3.64
9	385/65R22.5	ON/OFF	3915	160K	Y	5	5	5	11.75	1 500	3 258	2	3	2	N	57.5	3.55
7	385/65R22.5	LONG HAUL	0814	160K	N	5	4	5	11.75	1 700	3 279	2	3	2	N	60.5	4.47
7	385/65R22.5	LONG HAUL	4115	160K	N	4	3	3	11.75	1 700	3 282	3	3	3	N	61.5	4.21
7	385/65R22.5	LONG HAUL	4115	160K	N	5	3	4	11.75	1 700	3 281	3.5	3	3.5	N	61.5	4.21
7	385/65R22.5	REGIONAL	0512	160J	N	3	3	2	11.75	1 700	3 262	2	3	2	Y	58.5	4.42
7	385/65R22.5	REGIONAL	1811	160J	N	4	6	6	11.75	1 700	3 265	2	3	2.5	N	58.0	4.26
7	385/65R22.5	REGIONAL	0111	160J	N	6	5	6	11.75	1 700	3 265	2	3	2	N	59.5	4.14
7	385/65R22.5	ON/OFF	4811	160J	N	2	5	3	11.75	1 800	3 282	2	3	2	N	62.0	4.40
7	385/65R22.5	ON/OFF	1513	160J	Y	5	6	6	11.75	1 800	3 281	2	3	2	N	62.0	4.31
6	385/65R22.5	LONG HAUL	3611	158L	N	5	4	6	11.75	1 700	3 230	2.2	2.5	2.5	N	59.0	3.87
6	385/65R22.5	LONG HAUL	4511	160K	N	5	4	6	11.75	1 700	3 238	2.5	3	2.5	N	60.0	3.89
6	385/65R22.5	LONG HAUL	3411	160K	N	4	3	5	11.75	1 700	3 240	2	3	2	N	59.0	3.87
6	385/65R22.5	REGIONAL	0316	158L	Y	5	2	3	11.75	1 700	3 236	2.5	2.7	2.5	N	59.0	3.43
6	385/65R22.5	REGIONAL	4214	158L	N	4	2	4	11.75	1 700	3 237	3	3	3	N	60.5	3.46
6	385/65R22.5	REGIONAL	4914	158L	N	6	5	6	11.75	1 700	3 236	3	2.5	3	N	59.5	3.76
6	385/65R22.5	ON/OFF	0114	158L	Y	4	5	5	11.75	1 800	3 246	2	3	1.8	N	58.5	3.70
6	385/65R22.5	ON/OFF	0814	158L	Y	3	5	4	11.75	1 800	3 250	2.5	3	2.5	N	59.0	3.77
6	385/65R22.5	ON/OFF	4613	158L	Y	5	6	5	11.75	1 800	3 246	2	2.7	2.2	N	60.0	3.68
1	385/65R22.5	LONG HAUL	1511	160K	N	4	4	3	11.75	1 800	3 249	2	3	1.5	N	57.5	4.12
1	385/65R22.5	LONG HAUL	3215	160K	N	2	3	4	11.75	1 800	3 250	3	3	2	Y	61.5	4.11
1	385/65R22.5	LONG HAUL	3310	160K	N	6	5	4	11.75	1 800	3 250	2	3	3	N	63.0	4.28
1	385/65R22.5	REGIONAL	0116	158L	N	4	4	3	11.75	2 500	3 243	2	2.5	2	N	60.5	4.13
1	385/65R22.5	REGIONAL	2714	158L	N	3	4	4	11.75	2 500	3 249	1.5	3	1	N	60.0	4.15
1	385/65R22.5	REGIONAL	3113	158L	N	4	4	3	11.75	2 500	3 250	2.3	3	2	N	60.5	3.92
1	385/65R22.5	ON/OFF	2714	158L	Y	6	5	6	11.75	2 500	3 250	1.5	3	2	N	60.5	4.14
1	385/65R22.5	ON/OFF	2514	158L	Y	4	5	6	11.75	2 500	3 249	1.5	3	2	N	62.0	4.14
1	385/65R22.5	ON/OFF	4614	158L	Y	6	5	4	11.75	2 500	3 242	2.5	3	2.3	N	60.0	4.19
4	385/65R22.5	LONG HAUL	4414	160K	N	4	4	3	11.75	2 500	3 252	2.5	3	2.5	Y	61.0	4.37
4	385/65R22.5	LONG HAUL	4314	160K	N	2	3	4	11.75	2 500	3 245	3	3	3	N	59.5	4.40
4	385/65R22.5	REGIONAL	1413	160K	N	4	4	2	11.75	2 500	3 245	2	2.5	2	N	59.5	4.20
4	385/65R22.5	REGIONAL	1714	160K	N	3	3	1	11.75	2 500	3 247	2	3	2.5	N	60.5	3.93
4	385/65R22.5	REGIONAL	3614	160K	N	4	3	1	11.75	2 500	3 247	2	3	2.5	N	59.5	4.13

Brand	Size	Use	DOT WY	LI/SI	MS	TD1	TD Center	TD2	Bead width	Buffing Radius	Buffing Circonf.	Rdepth1	Rdepth Center	Rdepth2	Patch present (N/Y)	Buffed tyre weigh	RRAC Casing (N/kN)
2	215/75R17.5	REGIONAL	2115	135/133 J	N	5	5	5	6	600	2 345	1.5	3	3	N	23	5.02
2	215/75R17.5	REGIONAL	0514	135/133 J	N	4	4	4	6	600	2 345	2	3	2.5	N	23	4.86
2	215/75R17.5	REGIONAL	4214	135/133 J	N	6	5	5	6	600	2 345	2.5	2.8	2.5	N	23	4.77
3	215/75R17.5	REGIONAL	3315	135/133 K	N	6	5	5	6	500	2 349	2.8	3	2.5	N	22	4.57
3	215/75R17.5	REGIONAL	2015	135/133 K	N	5	5	5	6	500	2 347	2.5	3	3	N	22	4.46
3	215/75R17.5	REGIONAL	2216	135/133 K	N	6	5	5	6	500	2 347	1.5	2.5	1.5	N	21.5	4.55
5	215/75R17.5	REGIONAL	1214	128/126 M	N	1	3	1	6	500	2 326	3	3	3	N	20.5	4.45
5	215/75R17.5	REGIONAL	1214	128/126 M	N	6	5	6	6	500	2 324	1.5	2.5	1.5	N	19	4.83
5	215/75R17.5	REGIONAL	4213	128/126 M	N	5	6	5	6	500	2 330	1.5	2.5	2	N	20	4.81
8	215/75R17.5	REGIONAL	3515	126/124 M	Y	2	3	2	6	450	2 337	2.8	2.5	2.5	N	17.5	4.42
8	215/75R17.5	REGIONAL	0915	126/124 M	Y	2	5	4	6	450	2 342	2.8	2.6	2.8	N	18	4.40
8	215/75R17.5	REGIONAL	2115	126/124 M	Y	5	4	2	6	450	2 342	3	2.5	2.8	N	17.5	4.46
9	215/75R17.5	REGIONAL	3915	135/133 J	Y	4	2	4	6	600	2 350	1	3	1	N	23.5	4.65
9	215/75R17.5	REGIONAL	4313	135/133 J	N	4	2	5	6	600	2 350	1.5	3	2	N	24.5	4.84
9	215/75R17.5	REGIONAL	4815	135/133 J	Y	6	6	6	6	600	2 342	2	3	2.2	N	24	4.62
7	215/75R17.5	REGIONAL	0112	126/124 M	Y	4	2	2	6	650	2 330	2	3	1.5	Y	21	5.64
7	215/75R17.5	REGIONAL	3314	126/124 M	Y	4	5	5	6	650	2 337	1.8	3	1.8	N	22	5.22
7	215/75R17.5	REGIONAL	0813	126/124 M	Y	5	5	4	6	650	2 338	2	3	1.5	N	22.5	5.30
2	315/70R22.5	LONG HAUL	4514	154/150 L	Y	6	5	5		950	3 108	2	2.5	2	N	49.0	3.86
2	315/70R22.5	LONG HAUL	3214	154/150 L	Y	7	5	7		950	3 113	2	3	3	N	51.5	3.72
2	315/70R22.5	LONG HAUL	0415	154/150 L	Y	8	7	7		950	3 114	2.8	3	2.8	N	51.0	3.67
2	315/70R22.5	REGIONAL	3814	152/148 M	Y	6	3	5		750	3 102	4	3	4	N	52.0	3.86
2	315/70R22.5	REGIONAL	4315	152/148 M	Y	5	5	7		750	3 100	4	3	4	N	50.5	3.83
2	315/70R22.5	REGIONAL	3814	152/148 M	Y	2	2	4		750	3 101	3.8	3	4	N	51.0	3.92
3	315/70R22.5	LONG HAUL	2415	156/150 L	N	8	8	6		1 000	3 062	2	3	2	N	46.0	4.05
3	315/70R22.5	LONG HAUL	0815	156/150 L	N	5	7	6		1 000	3 062	2	3	2	N	45.5	4.19
3	315/70R22.5	LONG HAUL	2515	156/150 L	Y	7	7	4		1 000	3 063	2.3	3	2.3	N	46.0	3.98
3	315/70R22.5	REGIONAL	0816	154/150 L	Y	6	5	5		1 100	3 060	1.5	3	1.5	N	45.0	4.05
3	315/70R22.5	REGIONAL	0516	154/150 L	Y	5	5	5		1 100	3 064	2	3	2	N	45.0	4.08
3	315/70R22.5	REGIONAL	0516	154/150 L	Y	4	5	6		1 100	3 063	1.8	3	1.8	N	45.0	4.04
5	315/70R22.5	LONG HAUL	0215	156/150 L	N	4	6	5		950	3 060	2	3	3	N	43.5	4.02
5	315/70R22.5	LONG HAUL	1315	156/150 L	N	8	9	7		950	3 060	2.5	3	2	N	43.0	3.97
5	315/70R22.5	LONG HAUL	0215	156/150 L	N	6	9	6		950	3 056	2.6	3	3	N	43.5	4.10
5	315/70R22.5	REGIONAL	4214	156/150 L	N	4	7	7		950	3 051	2	3	2	N	43.0	4.01
5	315/70R22.5	REGIONAL	2214	156/150 L	N	6	9	8		950	3 050	1.5	2.8	1.5	N	42.5	4.25
5	315/70R22.5	REGIONAL	1215	156/150 L	N	9	9	7		950	3 053	1	2.5	1	N	42.5	4.16
8	315/70R22.5	LONG HAUL	2714	154/150 L	Y	5	4	4		950	3 078	2	2.8	3	N	47.5	3.65
8	315/70R22.5	LONG HAUL	2714	154/150 L	Y	3	3	3		950	3 077	1.5	2.5	1.5	N	47.5	3.60
8	315/70R22.5	LONG HAUL	2714	154/150 L	Y	4	4	3		950	3 081	2.2	3	2.8	N	47.5	3.66
8	315/70R22.5	REGIONAL	1214	154/150 L	Y	5	5	3		950	3 071	2	3	2	N	46.0	4.04
8	315/70R22.5	REGIONAL	1715	154/150 L	Y	8	6	7		950	3 073	2.2	3	2.8	N	47.0	3.88
8	315/70R22.5	REGIONAL	5015	154/150 L	Y	7	6	6		950	3 071	2	3	2.2	N	46.0	3.82
9	315/70R22.5	LONG HAUL	1912	154/150 L	Y	6	4	7		950	3 074	3	3	3.5	Y	50.5	4.15
9	315/70R22.5	LONG HAUL	2212	154/150 L	Y	4	3	6		950	3 075	3.5	3	3.5	N	51.5	3.95
9	315/70R22.5	LONG HAUL	0315	154/150 L	Y	7	4	8		950	3 072	3.5	3	3.5	Y	50.5	3.98
9	315/70R22.5	REGIONAL	0214	154/150 L	Y	7	6	8		950	3 075	3.5	3	3.5	N	51.0	4.02
9	315/70R22.5	REGIONAL	0712	154/150 L	Y	7	5	8		950	3 076	2.5	2.5	3	N	50.5	4.02
9	315/70R22.5	REGIONAL	0415	154/150 L	Y	8	6	6		950	3 072	3	3	3.5	N	51.0	3.90
7	315/70R22.5	LONG HAUL	2211	154/150 L	Y	7	4	6		950	3 065	2	2.8	2	N	47.5	4.68
7	315/70R22.5	LONG HAUL	4612	154/150 L	Y	3	3	6		950	3 072	2	3	2.5	N	48.0	4.63
7	315/70R22.5	LONG HAUL	1413	154/150 L	Y	4	2	5		950	3 066	2	3	2	N	47.5	4.59
7	315/70R22.5	REGIONAL	4315	154/150 L	Y	6	4	4		950	3 069	1.5	2.6	1.5	N	49.5	4.61
7	315/70R22.5	REGIONAL	2112	154/150 L	Y	7	6	4		950	3 073	2	3	2.5	N	47.0	4.64
7	315/70R22.5	REGIONAL	4412	154/150 L	Y	7	5	5		950	3 063	2.5	3	2.5	N	47.5	4.62
6	315/70R22.5	LONG HAUL	4511	154/150 L	Y	4	3	4		1 300	3 049	2	3	3	N	50.0	4.13
6	315/70R22.5	LONG HAUL	2511	154/150 L	Y	5	5	5		1 300	3 041	2.5	3	2.5	N	50.0	4.48
6	315/70R22.5	LONG HAUL	1611	154/150 L	Y	2	3	5		1 300	3 048	2.5	3	2.5	N	49.5	4.35
6	315/70R22.5	REGIONAL	2916	154/150 L	Y	1	3	4		1 400	3 045	3	2.5	3	Y	50.0	3.97
6	315/70R22.5	REGIONAL	0315	154/150 L	Y	4	3	2		1 400	3 051	3.5	3	2.5	N	50.5	4.33
1	315/70R22.5	LONG HAUL	4714	152/148 M	Y	4	5	4		1 300	3 078	3.5	3	4	N	50.5	4.86
1	315/70R22.5	LONG HAUL	0714	152/148 M	Y	6	2	4		1 300	3 072	3	3	3	N	48.0	4.77
1	315/70R22.5	LONG HAUL	0414	152/148 M	Y	4	4	6		1 300	3 070	2	3	2.5	N	49.0	4.75
1	315/70R22.5	REGIONAL	5115	152/148 M	Y	3	3	6		1 300	3 073	2	3	3	N	49.0	4.51
1	315/70R22.5	REGIONAL	3515	152/148 M	Y	7	6	6		1 300	3 073	3	3	3	N	48.5	4.72
1	315/70R22.5	REGIONAL	5015	152/148 M	Y	10	9	10		1 300	3 073	2	2.8	2.8	N	48.0	4.38
4	315/70R22.5	LONG HAUL	4515	152/148 M	Y	2	3	3		1 300	3 075	1.5	2.5	2	N	48.5	4.44
4	315/70R22.5	REGIONAL	3311	152/148 M	Y	6	5	7		1 300	3 083	2.2	2.5	2.2	N	49.0	4.62
4	315/70R22.5	REGIONAL	0811	152/148 M	Y	8	4	7		1 300	3 086	2.5	3	3	N	50.0	4.69
4	315/70R22.5	REGIONAL	4813	152/148 M	Y	3	2	7		1 300	3 087	2.5	3	2.5	N	50.5	4.64

2	385/55R22.5	LONG HAUL	1616	160	N	2	6	6		1 650	3 037	3	3	3	N	58.0	3.91
2	385/55R22.5	LONG HAUL	2216	160	N	8	9	8		1 650	3 035	2.8	3	2.8	N	57.0	3.90
2	385/55R22.5	LONG HAUL	1116	160	N	2	4	2		1 650	3 030	2.8	3	2.8	N	57.0	3.97
2	385/55R22.5	REGIONAL	1711	160	N	3	2	2		1 800	3 032	2.2	3	2.5	N	54.5	3.63
2	385/55R22.5	REGIONAL	1815	160	N	6	4	6		1 800	3 033	3	3	3	N	57.0	3.90
2	385/55R22.5	REGIONAL	0215	160	N	8	6	7		1 800	3 035	2.8	2.8	2.8	N	56.0	3.90
3	385/55R22.5	LONG HAUL	4712	160	N	5	8	6		1 650	3 021	2.5	3	2	Y	52.5	3.98
3	385/55R22.5	LONG HAUL	0514	160	N	7	9	6		1 650	3 023	3.5	3	3.5	N	53.0	4.14
3	385/55R22.5	LONG HAUL	3613	160	N	5	6	4		1 650	3 020	3.2	3	3.5	N	51.0	4.13
3	385/55R22.5	REGIONAL	1314	160	N	3	5	3		1 650	3 020	3.5	3	3.5	N	52.5	3.83
3	385/55R22.5	REGIONAL	1914	160	N	5	7	5		1 650	3 020	4	3	3.5	N	52.5	3.87
3	385/55R22.5	REGIONAL	1914	160	N	6	9	6		1 650	3 020	3.5	2.5	3.5	Y	53.0	4.06
5	385/55R22.5	LONG HAUL	4114	160	N	6	5	4		1 500	3 013	3.5	3	3.5	N	46.0	3.40
5	385/55R22.5	LONG HAUL	2315	160	N	4	5	5		1 500	3 012	3	3	3	N	45.5	3.51
5	385/55R22.5	LONG HAUL	2315	160	N	4	6	6		1 500	3 012	3	3	3.5	N	46.0	3.50
5	385/55R22.5	REGIONAL	4213	160	N	4	4	4		1 800	3 015	3	3	3.2	N	44.0	3.71
5	385/55R22.5	REGIONAL	0815	160	N	6	6	7		1 800	3 010	3	3	3.2	N	46.0	3.58
5	385/55R22.5	REGIONAL	4713	160	N	5	5	5		1 800	3 005	2.5	3	3	N	44.5	3.78
8	385/55R22.5	LONG HAUL	2114	160	N	4	2	2		1 650	3 034	2.5	3	2.2	N	52.0	3.59
8	385/55R22.5	LONG HAUL	4113	160	N	8	8	8		1 650	3 036	2.5	3	3	N	52.0	3.62
8	385/55R22.5	LONG HAUL	3113	160	N	3	3	4		1 650	3 031	2.8	3	2.5	N	52.0	3.60
8	385/55R22.5	REGIONAL	2114	160	N	5	4	5		1 650	3 034	2.5	3	2.2	N	53.0	3.80
8	385/55R22.5	REGIONAL	2016	160	N	11	10	11		1 650	3 034	2.7	3	3	N	52.0	3.63
8	385/55R22.5	REGIONAL	0515	160	N	5	5	4		1 650	3 033	1.8	2.5	2	N	51.5	3.60
9	385/55R22.5	LONG HAUL	2915	158	N	9	8	8		1 650	3 025	3	3	2	N	57.0	3.75
9	385/55R22.5	LONG HAUL	2915	158	N	9	8	8		1 650	3 027	3	3	3.5	N	57.0	3.55
9	385/55R22.5	LONG HAUL	1013	158	N	8	7	7		1 650	3 024	2.5	3	2.8	N	57.0	3.58
9	385/55R22.5	REGIONAL	3113	160	N	4	4	5		1 650	3 030	2	2.5	2.5	N	53.5	3.58
9	385/55R22.5	REGIONAL	1411	160	N	6	5	7		1 650	3 035	2	2.5	2	N	55.0	3.43
9	385/55R22.5	REGIONAL	0512	160	N	9	6	8		1 650	3 040	2.2	3	2.2	N	56.0	3.49
7	385/55R22.5	LONG HAUL	3214	160	N	4	6	6		1 800	3 030	2.2	3	2.2	N	53.5	4.24
7	385/55R22.5	LONG HAUL	1914	160	N	6	5	5		1 800	3 033	2.5	3	2.5	N	53.0	4.15
7	385/55R22.5	REGIONAL	2010	160	N	4	8	6		2 000	3 035	1.8	3	2	N	52.0	4.38
7	385/55R22.5	REGIONAL	2110	160	N	3	4	4		2 000	3 033	2.8	3	2.8	N	53.0	4.13
7	385/55R22.5	REGIONAL	4310	160	N	4	6	3		2 000	3 035	2	3	1.5	N	52.5	4.36
2	275/70R22.5	URBAN	4613	148/145 J	Y	6	4	4		800	2 900	3.5	3	3.5	Y	41.5	4.2
2	275/70R22.5	URBAN	4413	148/145 J	Y	6	6	5		800	2 892	3.5	3	3.5	N	41.0	4.3
3	275/70R22.5	URBAN	4014	150/145 J	Y	6	6	6		800	2 916	3	3	3	N	39.0	4.5
3	275/70R22.5	URBAN	0916	150/145 J	Y	6	4	4		800	2 903	2	2.5	2	N	39.0	4.4
3	275/70R22.5	URBAN	0715	150/145 J	Y	5	6	4		800	2 916	3	3	3	N	39.0	4.4
5	275/70R22.5	URBAN	3514	148/145 J	Y	6	6	3		800	2 913	2	2.5	2	N	42.0	4.4
5	275/70R22.5	URBAN	3112	148/145 J	Y	6	6	6		800	2 909	3.5	3	3	N	41.5	4.5
5	275/70R22.5	URBAN	3112	148/145 J	Y	6	6	6		800	2 914	3	3	3	Y	42.0	4.3
8	275/70R22.5	URBAN	1515	148/145 J	Y	6	5	2		800	2 898	2	2.8	2.2	N	42.5	4.3
8	275/70R22.5	URBAN	4314	148/145 J	Y	5	6	6		800	2 896	2	2.5	2.5	N	41.5	4.2
8	275/70R22.5	URBAN	1515	148/145 J	Y	6	6	4		800	2 897	1.5	2.7	1.5	N	42.0	4.4
9	275/70R22.5	URBAN	2615	148/145 J	Y	6	6	6		800	2 902	3	2.8	2.5	N	40.0	3.7
9	275/70R22.5	URBAN	3813	148/145 J	Y	5	6	6		800	2 900	3.4	3	3	N	40.0	3.9
6	275/70R22.5	URBAN	4711	148/145 J	Y	6	6	6		900	2 903	2	3	3	N	44.0	4.5
6	275/70R22.5	URBAN	2111	148/145 J	Y	5	4	5		900	2 894	2.5	3	2.5	N	41.5	4.3
6	275/70R22.5	URBAN	3711	148/145 J	Y	6	6	6		900	2 890	2	3	2	N	42.0	4.7
1	275/70R22.5	URBAN	1215	148/145 J	Y	10	9	10		1 100	2 925	1.5	3	2	N	38.0	4.1
1	275/70R22.5	URBAN	3514	148/145 J	Y	9	6	7		1 100	2 924	1.5	3	2.5	N	35.5	4.4
1	275/70R22.5	URBAN	1614	148/145 J	Y	5	6	8		1 100	2 924	2	3	2	N	39.0	4.4
2	315/60R22.5	LONG HAUL	1716	152/148 L	Y	2	1	4		2 000	2 905	2.8	3	2.8	N	45.5	3.9
2	315/60R22.5	LONG HAUL	3215	152/148 L	Y	6	5	5		2 000	2 900	3	3	2.5	N	45.0	4.1
2	315/60R22.5	LONG HAUL	4316	154/148 L	N	8	4	8		2 000	2 892	2.8	2.8	2.9	N	42.0	4.1
3	315/60R22.5	LONG HAUL	4314	152/148 L	Y	4	5	5		2 000	2 900	1.8	2.6	1.8	N	43.0	4.4
3	315/60R22.5	LONG HAUL	2815	152/148 L	Y	3	4	6		2 000	2 897	2.2	3	2.2	N	44.0	4.4
3	315/60R22.5	LONG HAUL	2815	152/148 L	Y	3	5	6		2 000	2 898	2.2	3	2.2	N	43.5	4.4
5	315/60R22.5	LONG HAUL	3815	154/148 L	N	6	8	8		1 800	2 892	3	3	3	N	44.0	4.1
5	315/60R22.5	LONG HAUL	1015	154/148 L	N	4	5	6		1 800	2 895	2.5	2.6	2.5	N	44.0	4.2
5	315/60R22.5	LONG HAUL	0516	154/148 L	N	5	3	4		1 800	2 892	3	3	3	N	44.0	4.0
8	315/60R22.5	LONG HAUL	4015	152/148 L	Y	5	2	4		1 500	2 887	2.5	3	2.5	Y	45.0	4.3
8	315/60R22.5	LONG HAUL	4015	152/148 L	Y	5	3	5		1 500	2 891	2.8	3	2.8	N	46.0	4.3
8	315/60R22.5	LONG HAUL	4015	152/148 L	Y	6	4	6		1 500	2 891	2.9	3	2.9	N	45.5	4.3
9	315/60R22.5	LONG HAUL	5013	152/148 L	Y	7	7	8		1 500	2 892	2.5	3	2.8	Y	43.5	4.0
9	315/60R22.5	LONG HAUL	5113	152/148 L	Y	5	6	7		1 500	2 893	2.5	3	2.5	N	44.0	3.9
7	315/60R22.5	LONG HAUL	4413	152/148 L	Y	4	6	6		2 000	2 890	2	3	2	N	45.0	4.8
7	315/60R22.5	LONG HAUL	1514	152/148 L	Y	7	8	8		2 000	2 891	2.2	3	2.2	N	45.5	4.8
7	315/60R22.5	LONG HAUL	4311	152/148 L	Y	7	6	6		2 000	2 892	1.5	3	2	N	46.5	5.2

Brand	Size	Use	DOT WY	LI/SI	M S	TD1	TD Center	TD2	Bead width	Buffing Radius	Buffing Circonf.	Rdepth1	Rdepth Center	Rdepth2	Patch present (N/Y)	Buffe d tyre weigh	RRAC Casing (N/kN)
2	315/80R22.5	LONG HAUL	0616	156/150 L	Y	7	5	5		900	3 276	2.5	3	3	N	52.5	3.83
2	315/80R22.5	LONG HAUL	4514	156/150 L	Y	4	1	4		900	3 273	2.5	3	3	N	51.5	3.84
2	315/80R22.5	LONG HAUL	0616	156/150 L	Y	7	4	7		900	3 273	2	3	2.5	N	52.0	3.84
2	315/80R22.5	REGIONAL	4412	154/150 M	Y	5	6	9		900	3 282	3	3	3	Y	54.0	4.34
2	315/80R22.5	REGIONAL	1214	154/150 M	Y	5	4	6		900	3 280	1.5	2.5	2.5	Y	54.0	4.37
2	315/80R22.5	REGIONAL	1214	154/150 M	Y	5	2	3		900	3 282	2	2.5	2	N	54.0	4.50
2	315/80R22.5	ON/OFF	2716	156/150 K	Y	7	7	7		900	3 282	3	3	3	N	53.5	4.23
2	315/80R22.5	ON/OFF	2716	156/150 K	Y	8	8	5		900	3 281	3	3	3	N	53.0	4.26
2	315/80R22.5	ON/OFF	2716	156/150 K	Y	5	5	7		900	3 281	3	2.5	3	N	52.5	4.26
3	315/80R22.5	LONG HAUL	4614	156/150 L	Y	5	4	5		900	3 281	2.2	3	2.2	N	52.0	4.44
3	315/80R22.5	LONG HAUL	1016	156/150 L	Y	4	3	4		900	3 279	1.5	2.5	1.8	N	51.0	4.39
3	315/80R22.5	LONG HAUL	4814	156/150 L	Y	4	2	4		900	3 284	2.5	3	2.5	N	52.0	4.43
3	315/80R22.5	REGIONAL	2815	156/150 L	Y	3	6	6		900	3 281	2.5	3	2.5	N	52.0	4.50
3	315/80R22.5	REGIONAL	2215	156/150 L	Y	6	6	6		900	3 281	3	3	3	N	50.5	4.38
3	315/80R22.5	REGIONAL	1916	156/150 L	Y	10	10	10		900	3 281	2.5	3	2.8	N	52.5	4.33
3	315/80R22.5	ON/OFF	4615	156/150 K	Y	11	8	11		900	3 282	3	2.8	2.8	N	53.0	4.63
3	315/80R22.5	ON/OFF	3516	156/150K	Y	10	6	9		900	3 281	3	3	3	N	53.5	4.62
3	315/80R22.5	ON/OFF	3516	156/150K	Y	8	5	8		900	3 282	3	2.5	3	N	53.0	4.63
5	315/80R22.5	LONG HAUL	4913	156/150 L	N	9	9	9		900	3 280	2.5	3	3	N	47.5	4.33
5	315/80R22.5	REGIONAL	1815	156/150 L	Y	2	3	6		900	3 280	2.8	3	2.5	N	46.5	4.39
5	315/80R22.5	REGIONAL	0515	156/150 L	N	3	6	7		900	3 281	2.5	3	3	N	46.5	4.12
5	315/80R22.5	REGIONAL	0515	156/150 L	N	2	3	5		900	3 281	3	2.5	3	N	47.5	4.14
5	315/80R22.5	ON/OFF	0315	156/150 K	Y	4	3	6		900	3 276	3	3	3	N	51.0	4.60
5	315/80R22.5	ON/OFF	1113	156/150 K	Y	8	7	4		900	3 278	3.5	3	3	Y	51.5	4.57
5	315/80R22.5	ON/OFF	0315	156/150 K	Y	5	3	6		900	3 276	3	3	3	Y	51.0	4.70
8	315/80R22.5	LONG HAUL	0715	156/150 L	Y	6	7	6		800	3 277	3	2.5	3	N	53.0	3.91
8	315/80R22.5	LONG HAUL	3114	156/150 L	Y	6	3	4		800	3 279	2.7	2.8	3	N	53.0	4.18
8	315/80R22.5	LONG HAUL	3414	156/150 L	Y	8	2	8		800	3 281	3	3	3	N	52.5	4.07
8	315/80R22.5	REGIONAL	2614	156/150 L	Y	7	5	6		800	3 285	2	2.5	2.5	N	53.5	4.46
8	315/80R22.5	REGIONAL	4414	156/150 L	Y	6	5	8		800	3 277	2.8	3	3	N	53.0	3.96
8	315/80R22.5	REGIONAL	2912	156/150 L	Y	5	4	4		800	3 281	2.7	3	2.7	N	55.0	4.28
8	315/80R22.5	ON/OFF	0113	156/150 K	Y	6	12			800	3 266	3	3	3	N	57.0	4.23
8	315/80R22.5	ON/OFF	0714	156/150 K	Y	5	9			800	3 268	2.8	3	3	N	57.0	4.13
8	315/80R22.5	ON/OFF	4013	156/150 K	Y	7	7			800	3 268	3	3	3	N	57.5	4.16
9	315/80R22.5	LONG HAUL	0415	156/150 L	Y	7	3	7		850	3 288	3	3	3	N	54.5	4.42
9	315/80R22.5	LONG HAUL	3615	156/150 L	Y	9	7	9		850	3 280	3	3	3	N	55.5	4.31
9	315/80R22.5	LONG HAUL	3913	156/150 L	Y	6	8	5		850	3 279	2.5	3	3	N	57.5	4.40
9	315/80R22.5	REGIONAL	2516	156/150 L	Y	12	13	12		850	3 276	2.5	3	3	N	53.5	4.03
9	315/80R22.5	REGIONAL	4810	156/150 L	Y	9	5	5		850	3 275	3	3	2.6	N	55.0	4.23
9	315/80R22.5	ON/OFF	4714	156/150 K	Y	7	9			850	3 281	2.8	3	3	Y	55.0	4.24
9	315/80R22.5	ON/OFF	0315	156/150 K	Y	7	7			850	3 277	2.8	3	3	N	54.5	4.07
9	315/80R22.5	ON/OFF	4714	156/150 K	Y	6	7			850	3 279	2.5	2.5	2.5	Y	53.5	4.22
7	315/80R22.5	LONG HAUL	2814	156/150 L	Y	7	3	4		800	3 271	2.8	2.7	3	N	55.0	4.59
7	315/80R22.5	LONG HAUL	2814	156/150 L	Y	5	4	7		800	3 270	3	3	3	N	55.5	4.72
7	315/80R22.5	LONG HAUL	2814	156/150 L	Y	6	3	6		800	3 271	2.5	3	3	Y	55.5	4.68
7	315/80R22.5	REGIONAL	0113	154/150 M	Y	6	5	6		800	3 272	3	3	3	N	54.0	4.84
7	315/80R22.5	REGIONAL	2713	154/150 M	Y	7	3	5		800	3 272	2.8	3	3	N	53.5	4.82
7	315/80R22.5	REGIONAL	5214	154/150 M	Y	11	7	9		800	3 274	3	3	3	N	55.0	4.44
7	315/80R22.5	ON/OFF	0515	156/150 K	Y	10	11			700	3 271	2.8	2.6	3	Y	56.0	4.39
7	315/80R22.5	ON/OFF	0615	156/150 K	Y	6	8			700	3 269	2.8	3	2.8	Y	56.0	4.53
7	315/80R22.5	ON/OFF	0515	156/150 K	Y	8	6			700	3 268	2.5	2.8	2.8	N	56.0	4.39
6	315/80R22.5	LONG HAUL	4511	156/150 L	Y	12	10	11		850	3 256	2.7	3	3	N	55.5	4.42
6	315/80R22.5	ON/OFF	2515	156/150 K	Y	10	11			700	3 242	3	3	3	N	53.5	3.94
6	315/80R22.5	ON/OFF	3415	156/150 K	Y	7	11			700	3 241	2	2.5	2	N	53.5	4.29
6	315/80R22.5	ON/OFF	1616	156/150 K	Y	10	10	0		700	3 241	3	3	3	N	53.5	3.89
1	315/80R22.5	LONG HAUL	3315	154/150 M	N	4	4	5		850	3 274	2.5	3	3	N	55.5	4.39
1	315/80R22.5	LONG HAUL	2312	154/150 M	N	3	1	3		850	3 273	2.5	3	2.5	N	53.5	4.50
1	315/80R22.5	LONG HAUL	4213	154/150 M	N	6	7	6		850	3 273	2.5	3	2.8	N	53.5	4.36
1	315/80R22.5	REGIONAL	0715	154/150 M	Y	8	3	3		850	3 273	3	3	3	N	55.5	4.33
1	315/80R22.5	REGIONAL	3414	154/150 M	Y	10	6	9		850	3 278	2	3	2.5	N	55.0	4.35
1	315/80R22.5	REGIONAL	1714	154/150 M	Y	2	2	8		850	3 278	2.5	3	3	N	55.0	4.40
1	315/80R22.5	ON/OFF	2514	156/150 K	Y	5	5	5		850	3 278	3	3	4	Y	55.5	4.37
1	315/80R22.5	ON/OFF	4214	156/150 K	Y	7	7	9		850	3 280	3	3	4	N	55.0	4.20
4	315/80R22.5	REGIONAL	3715	156/152 L	Y	7	3	6		850	3 293	3	3	2.8	N	54.0	4.40
4	315/80R22.5	REGIONAL	3115	156/152 L	Y	5	1	4		850	3 296	2.5	3	2.5	N	55.5	4.48
4	315/80R22.5	ON/OFF	2715	156/152 L	Y	10	9			850	3 302	3	3	3.5	N	55.0	4.58
4	315/80R22.5	ON/OFF	4714	156/152 L	Y	7	7	4		850	3 298	2.5	2.8	2.5	N	55.5	4.56
4	315/80R22.5	ON/OFF	2713	156/152 L	Y	9	9	7		850	3 301	2.5	2.8	3	N	56.0	4.79

Brand	Size	Use	DOT WY	LI/SI	M S	TD1	TD Center	TD2	Bead width	Buffing Radius	Buffing Circonf.	Rdepth1	Rdepth Center	Rdepth2	Patch present (N/Y)	Buffe d tyre weigh	RRAC Casing (N/kN)
2	295/80R22.5	LONG HAUL	1015	152/148 M	Y	4	2	2	9	800	3 199	2	2.8	2.2	N	46.5	4.02
2	295/80R22.5	LONG HAUL	1115	152/148 M	Y	5	3	4	9	800	3 200	2.2	3	2	N	46.5	4.06
2	295/80R22.5	LONG HAUL	1015	152/148 M	Y	5	4	4	9	800	3 203	2.5	3	2.5	N	47.0	3.93
2	295/80R22.5	REGIONAL	0715	152/148 M	Y	3	5	3	9	800	3 203	2	2.6	2.5	N	49.0	4.26
2	295/80R22.5	REGIONAL	4514	152/148 M	Y	4	3	3	9	800	3 198	2.5	3	3	N	49.5	4.24
2	295/80R22.5	REGIONAL	4514	152/148 M	Y	3	3	3	9	800	3 200	2.5	3	2.8	N	49.5	4.16
3	295/80R22.5	LONG HAUL	4215	154/149 M	Y	6	3	2	9	800	3 182	2.5	3	2.8	N	46.5	4.18
3	295/80R22.5	LONG HAUL	4915	154/149 M	Y	7	7	6	9	800	3 183	2	3	2.5	N	45.5	4.24
3	295/80R22.5	LONG HAUL	2114	154/149 M	Y	6	7	6	9	800	3 184	2.5	3	2.5	N	45.0	4.06
3	295/80R22.5	REGIONAL	4412	152/148 M	N	5	4	6	9	800	3 187	1.5	2.6	1.5	N	45.5	4.41
3	295/80R22.5	REGIONAL	4514	152/148 M	N	5	7	7	9	800	3 195	2.3	2.8	2.5	N	46.0	4.53
3	295/80R22.5	REGIONAL	3113	152/148 M	N	7	6	6	9	800	3 194	2	2.5	2.5	N	46.0	4.42
5	295/80R22.5	LONG HAUL	1215	154/149 M	Y	8	6	7	9	800	3 187	3	3	2.8	N	47.5	4.57
5	295/80R22.5	LONG HAUL	1215	154/149 M	Y	7	5	5	9	800	3 182	2.5	3	2.5	N	46.0	4.55
5	295/80R22.5	LONG HAUL	1215	154/149 M	Y	7	5	8	9	800	3 184	2.5	2.7	2.5	N	47.0	4.47
5	295/80R22.5	REGIONAL	1414	154/149 M	N	8	8	6	9	800	3 192	4	3	3	N	46.5	4.52
5	295/80R22.5	REGIONAL	4913	154/149 M	N	8	8	4	9	800	3 193	3.5	3	3	N	46.5	4.42
5	295/80R22.5	REGIONAL	0715	152/149 M	N	11	10	11	9	800	3 193	3.2	3	3.2	N	46.5	4.61
8	295/80R22.5	LONG HAUL	2513	152/148 M	N	3	3	3	9	700	3 197	2.5	2.5	2.5	N	43.5	4.06
8	295/80R22.5	LONG HAUL	1015	152/148 M	N	5	5	7	9	700	3 199	3	3	3	N	45.0	3.96
8	295/80R22.5	LONG HAUL	1015	152/148 M	N	5	4	6	9	700	3 200	3	3	3	N	45.0	3.90
8	295/80R22.5	REGIONAL	2713	152/148 M	Y	7	4	3	9	700	3 200	2	2.5	2.5	N	47.0	3.95
8	295/80R22.5	REGIONAL	2414	152/148 M	Y	2	3	2	9	700	3 206	2.5	2.7	2.5	N	46.5	4.16
8	295/80R22.5	REGIONAL	2514	152/148 M	Y	2	3	3	9	700	3 212	2.2	2.5	2.2	N	47.0	4.16
9	295/80R22.5	LONG HAUL	0515	152/148 M	Y	8	8	8	9	800	3 210	2	3	2.5	N	50.0	4.25
9	295/80R22.5	REGIONAL	0714	152/148 M	Y	9	6	9	9	800	3 210	2.5	3	3	N	49.5	4.07
9	295/80R22.5	REGIONAL	5014	152/148 M	Y	5	6	9	9	800	3 203	3	3	3	N	51.5	4.09
9	295/80R22.5	REGIONAL	5014	152/148 M	Y	8	3	3	9	800	3 201	3	3	3	N	51.0	4.04
7	295/80R22.5	LONG HAUL	2411	152/148 M	N	5	4	4	9	700	3 200	3	2.5	3	N	45.5	4.59
7	295/80R22.5	LONG HAUL	4114	152/148 M	N	8	10	10	9	700	3 200	4	3	4	N	47.0	4.11
7	295/80R22.5	REGIONAL	5013	152/148 M	Y	7	4	7	9	800	3 195	2.5	3	2.5	N	49.5	4.69
7	295/80R22.5	REGIONAL	4314	152/148 M	Y	6	4	7	9	800	3 194	2.8	3	3	N	50.5	4.65
7	295/80R22.5	REGIONAL	4814	152/148 M	Y	7	6	7	9	800	3 193	2	2.5	2.5	N	50.5	4.58
6	295/80R22.5	LONG HAUL	4910	152/148 M	Y	2	5	7	9	1 000	3 146	2.5	3	2.5	Y	47.0	4.24
6	295/80R22.5	LONG HAUL	2911	152/148 M	Y	7	5	7	9	1 000	3 142	3	3	3	N	46.0	4.53
6	295/80R22.5	LONG HAUL	2911	152/148 M	Y	7	5	6	9	1 000	3 143	3	3	2.5	Y	46.5	4.54
6	295/80R22.5	REGIONAL	2712	152/148 M	Y	6	3	7	9	1 000	3 145	3	2.5	2.5	N	49.5	4.51
6	295/80R22.5	REGIONAL	1013	152/148 M	Y	10	5	9	9	1 000	3 150	4	3	3	N	49.0	4.15
6	295/80R22.5	REGIONAL	3612	152/148 M	Y	5	3	8	9	1 000	3 146	3	2.5	2.5	N	49.0	4.51
6	295/80R22.5	ON/OFF	3115	152/149 K	Y	6	6	6	9	1 000	3 144	3	3	2.5	N	51.5	4.14
6	295/80R22.5	ON/OFF	2813	152/149 K	Y	3	2	2	9	1 000	3 142	3	3	2.5	N	48.5	4.19
6	295/80R22.5	ON/OFF	2313	152/149 K	Y	6	4	4	9	1 000	3 141	3	3	2.5	N	48.0	4.15
1	295/80R22.5	LONG HAUL	4015	152/149 M	N	5	4	7	9	900	3 165	3	3	3	N	48.0	4.05
1	295/80R22.5	LONG HAUL	0515	152/149 M	N	3	2	4	9	900	3 165	2.8	2.8	2.8	N	48.5	4.01
1	295/80R22.5	LONG HAUL	1816	152/149 M	N	8	6	8	9	900	3 163	2.5	2.5	2.8	Y	48.0	4.11
1	295/80R22.5	REGIONAL	0213	152/149 M	Y	5	5	6	9	1 100	3 170	2	3	3	Y	50.0	4.26
1	295/80R22.5	REGIONAL	2513	152/149 M	Y	6	6	9	9	1 100	3 167	2	3	2	N	49.0	4.27
1	295/80R22.5	REGIONAL	4115	152/149 M	Y	6	3	3	9	1 100	3 176	2.5	3	3	N	50.5	4.14
4	295/80R22.5	LONG HAUL	2114	152/149 M	N	7	4	5	9	800	3 194	3	2.5	3	N	49.5	4.56
4	295/80R22.5	LONG HAUL	1707	152/148 M	N	6	5	5	9	800	3 201	4	3	3	N	49.0	4.27
4	295/80R22.5	LONG HAUL	2114	152/149 M	N	6	3	5	9	800	3 201	3	3	3	N	50.0	4.35
4	295/80R22.5	REGIONAL	2510	152/148 M	Y	7	5	9	9	800	3 162	3	3	3	N	49.5	4.76
4	295/80R22.5	REGIONAL	2909	152/148 M	Y	5	4	7	9	800	3 160	3	3	3	N	48.5	4.78
4	295/80R22.5	REGIONAL	2011	152/149 M	Y	10	4	9	9	800	3 163	2.5	2.5	2.5	N	47.5	4.81

Brand	Size	Use	DOT WY	LI/SI	M S	TD1	TD Center	TD2	Bead width	Buffing Radius	Buffing Circonf.	Rdepth1	Rdepth Center	Rdepth2	Patch present (N/Y)	Buffe d tyre weigh	RRAC Casing (N/kN)
2	13R22.5	ON/OFF	4013	154/150 K	Y	8	8	8		650	3429	3	2,5	3	N	56.5	4.55
2	13R22.5	ON/OFF	0215	154/150 K	Y	7	5	9		650	3430	3,5	3	3,5	N	56.0	4.35
2	13R22.5	ON/OFF	4013	154/150 K	Y	8	9	9		650	3430	3,5	3	3,5	N	57.0	4.57
3	13R22.5	ON/OFF	2312	156/150 K	Y	8	3	6		650	3409	2,5	3	2	N	58.0	5.05
3	13R22.5	ON/OFF	2312	156/150 K	Y	4	2	7		650	3409	2	3	2	N	58.0	5.11
3	13R22.5	ON/OFF	2312	156/150 K	Y	10	2	5		650	3410	2,5	2,5	2	N	57.5	5.34
5	13R22.5	ON/OFF	2313	156/150 K	Y	4	2	6		650	3400	4	3	4	N	56.5	4.48
5	13R22.5	ON/OFF	0515	156/150 K	Y	10	4	3		650	3395	3	3	3	N	55.5	4.70
5	13R22.5	ON/OFF	1714	156/150 K	Y	8	5	11		650	3400	3,5	3	3,5	N	58.0	4.83
8	13R22.5	ON/OFF	1014	156/150 K	Y	9	7	7		650	3390	2,2	2,5	2	N	58.0	4.53
8	13R22.5	ON/OFF	0713	156/150 K	Y	5	8	8		650	3380	2,5	3	3	N	58.5	4.56
8	13R22.5	ON/OFF	1013	156/150 K	Y	7	6	6		650	3380	2,5	3	2	N	59.0	4.48
9	13R22.5	ON/OFF	0215	156/150 K	Y	11	8	8		650	3402	3	2,6	2,8	N	58.5	4.46
9	13R22.5	ON/OFF	0713	156/150 K	Y	8	7	7		650	3392	3,5	3	3,5	N	60.0	4.20
7	13R22.5	ON/OFF	2114	154/150 K	Y	3	5	5		650	3402	3	3	3,5	N	56.5	4.41
7	13R22.5	ON/OFF	0113	154/150 K	Y	3	9	9		650	3393	3	3	3	Y	56.5	4.36
7	13R22.5	ON/OFF	4711	154/150 K	Y	6	8	8		650	3397	3	3	3	Y	57.5	4.36
6	13R22.5	ON/OFF	3415	154/150 K	Y	12	12	2		650	3374	2,8	2,5	2,8	N	58.5	4.37
6	13R22.5	ON/OFF	3515	154/150 K	Y	12	13	3		650	3375	3	2,8	3	N	58.5	4.63
6	13R22.5	ON/OFF	3515	154/150 K	Y	12	13	3		650	3375	2,8	2,8	2,5	N	58.5	4.63
1	13R22.5	ON/OFF	0415	154/151 K	Y	4	11	1		650	3426	3,5	3	3,5	N	59.0	4.61
3	445/45R19.5	LONG HAUL	4415	160 J	Y	5	6	6		3 000	2721	2,8	3,0	2,8	N	53.0	4.70
3	445/45R19.5	LONG HAUL	4215	160 J	Y	4	6	6		3 000	2718	2	2,8	2,5	N	52.5	4.70
3	445/45R19.5	LONG HAUL	4215	160 J	Y	8	8	7		3 000	2718	2,8	3,0	2,8	N	53.0	4.73
8	445/45R19.5	LONG HAUL	2414	160 J	N	6	3	6		3 000	2732	3	3	3	N	52.0	4.14
8	445/45R19.5	LONG HAUL	1113	160 J	N	6	2	3		3 000	2730	3	3	3	N	51.0	4.16
8	445/45R19.5	LONG HAUL	3015	160 J	Y	5	2	2		3 000	2730	2,5	2,5	2,5	N	50.0	4.11

TD Center is the remaining tread depth at the center of the tyre before buffing.

TD1 and TD2 are the remaining tread depths at the shoulders of the tyre before buffing.

Rdepth Center is the remaining rubber thickness at the center of the tyre after buffing.

Rdepth1 and Rdepth2 are the remaining thickness at the shoulders of the tyre after buffing.

9.3. DESIGN OF EXPERIMENT "PROCESS IMPACT" DATA FOR ROLLING RESISTANCE

Size	DOT CASING	L.I./S.I.	Original M+S (Y/N)	Process	HSE	P1 (remaining rubber)	P2 (Buffing radius)	P3 cushion gauge (mm)	P4 curing t° (°C)	P5 curing time (min)	Tyre weight (kg)	RRC Tire	RRC casing
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	1	800	1.5	95	240	72.0	7.7	3.22
315/80R22.5	2415	156/150L (154/150M)	N	Cold	21	1	800	1.5	95	240	73.0	7.5	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	1	800	1.5	95	240	73.5	7.7	
315/80R22.5	1915	156/150L (154/150M)	N	Cold	21	1	800	1.5	125	480	73.5	7.7	
315/80R22.5	2415	156/150L (154/150M)	N	Cold	21	1	800	1.5	125	480	73.5	7.7	
315/80R22.5	2415	156/150L (154/150M)	N	Cold	21	1	800	1.5	125	480	73.0	7.5	
315/80R22.5	1915	156/150L (154/150M)	N	Cold	21	1	2000	3	95	240	76.0	8.1	3.56
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	1	2000	3	95	240	76.0	8.0	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	1	2000	3	95	240	76.0	8.0	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	1	2000	3	125	480	76.0	8.2	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	1	2000	3	125	480	76.0	8.2	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	1	2000	3	125	480	76.0	8.6	
315/80R22.5	1815	156/150L (154/150M)	N	Cold	21	4	800	3	95	480	75.0	7.7	3.12
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	4	800	3	95	480	74.5	7.9	
315/80R22.5	2415	156/150L (154/150M)	N	Cold	21	4	800	3	95	480	75.5	7.7	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	4	800	3	125	240	75.0	7.7	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	4	800	3	125	240	76.0	7.7	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	4	800	3	125	240	75.0	7.8	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	4	2000	1.5	95	480	75.0	8.0	3.51
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	4	2000	1.5	95	480	76.0	8.1	
315/80R22.5	1815	156/150L (154/150M)	N	Cold	21	4	2000	1.5	95	480	75.0	8.0	
315/80R22.5	1815	156/150L (154/150M)	N	Cold	21	4	2000	1.5	125	240	76.0	8.2	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	4	2000	1.5	125	240	75.0	8.2	
315/80R22.5	2315	156/150L (154/150M)	N	Cold	21	4	2000	1.5	125	240	76.0	8.3	

Size	DOT CASING	L.I./S.I.	Original M+S (Y/N)	Process	HSE	P1 (remaining rubber)	P2 (Buffing radius)	P3 cushion gauge (mm)	P4 curing t° (°C)	P5 curing time (min)	Tyre weight (kg)	RRC Tire	RRC casing
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	1	800	1,5	135	110	77,5	8,9	3,22
315/80R22.5	2415	156/150L (154/150M)	N	Hot	22	1	800	1,5	135	110	77,5	8,9	
315/80R22.5	1815	156/150L (154/150M)	N	Hot	22	1	800	1,5	135	110	79,5	8,9	
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	1	800	1,5	160	145	78,0	10,9	
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	1	800	1,5	160	145	77,0	10,7	
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	1	800	1,5	160	145	78,0	11,0	
315/80R22.5	1815	156/150L (154/150M)	N	Hot	22	1	2000	3	135	110	79,0	8,2	3,56
315/80R22.5	1915	156/150L (154/150M)	N	Hot	22	1	2000	3	135	110	79,0	8,1	
315/80R22.5	1815	156/150L (154/150M)	N	Hot	22	1	2000	3	135	110	80,5	8,2	
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	1	2000	3	160	145	79,5	9,7	
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	1	2000	3	160	145	79,5	9,4	
315/80R22.5	2415	156/150L (154/150M)	N	Hot	22	1	2000	3	160	145	79,5	9,7	
315/80R22.5	2415	156/150L (154/150M)	N	Hot	22	4	800	3	135	145	78,0	8,0	3,12
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	4	800	3	135	145	78,0	8,0	
315/80R22.5	1815	156/150L (154/150M)	N	Hot	22	4	800	3	135	145	79,5	8,2	
315/80R22.5	1815	156/150L (154/150M)	N	Hot	22	4	800	3	160	110	78,0	8,8	
315/80R22.5	2515	156/150L (154/150M)	N	Hot	22	4	800	3	160	110	78,0	8,8	
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	4	800	3	160	110	78,5	8,8	
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	4	2000	1,5	135	145	80,5	10,2	3,51
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	4	2000	1,5	135	145	79,5	10,1	
315/80R22.5	1815	156/150L (154/150M)	N	Hot	22	4	2000	1,5	160	110	82,0	12,1	
315/80R22.5	1815	156/150L (154/150M)	N	Hot	22	4	2000	1,5	160	110	82,0	12,1	
315/80R22.5	2315	156/150L (154/150M)	N	Hot	22	4	2000	1,5	160	110	81,0	12,1	

RRC are expressed in N/kN

HSE is original tread depth in mm

Size	DOT CASING	L.I./S.I.	Original M+S (Y/N)	Process	HSE	P1 (remaining rubber)	P2 (Buffing radius)	P3 cushion gauge (mm)	P4 curing t° (°C)	P5 curing time (min)	Tyre weight (kg)	RRC Tire	RRC casing
385/65R22.5	2315	160K (158L)	N	Cold	15.5	1	1100	1.5	95	240	77.5	5.26	2.95
385/65R22.5	2715	160K (158L)	N	Cold	15.5	1	1100	1.5	95	240	74.5	5.18	
385/65R22.5	1915	160K (158L)	N	Cold	15.5	1	1100	1.5	95	240	80.0	5.31	
385/65R22.5	1715	160K (158L)	N	Cold	15.5	1	1100	1.5	125	480	79.0	5.55	
385/65R22.5	2615	160K (158L)	N	Cold	15.5	1	1100	1.5	125	480	79.0	5.58	
385/65R22.5	2815	160K (158L)	N	Cold	15.5	1	1100	1.5	125	480	80.0	5.65	
385/65R22.5	1215	160K (158L)	N	Cold	15.5	1	2000	3	95	240	80.5	5.56	3.45
385/65R22.5	1715	160K (158L)	N	Cold	15.5	1	2000	3	95	240	81.0	5.63	
385/65R22.5	1415	160K (158L)	N	Cold	15.5	1	2000	3	95	240	81.0	5.6	
385/65R22.5	1915	160K (158L)	N	Cold	15.5	1	2000	3	125	480	80.5	5.73	
385/65R22.5	1715	160K (158L)	N	Cold	15.5	1	2000	3	125	480	80.5	5.89	
385/65R22.5	1715	160K (158L)	N	Cold	15.5	1	2000	3	125	480	80.0	5.81	
385/65R22.5	2315	160K (158L)	N	Cold	15.5	4	1100	3	95	480	79.5	5.25	2.95
385/65R22.5	1415	160K (158L)	N	Cold	15.5	4	1100	3	95	480	80.5	5.29	
385/65R22.5	2715	160K (158L)	N	Cold	15.5	4	1100	3	95	480	76.5	5.19	
385/65R22.5	1915	160K (158L)	N	Cold	15.5	4	1100	3	125	240	81.0	5.41	
385/65R22.5	2315	160K (158L)	N	Cold	15.5	4	1100	3	125	240		5.39	
385/65R22.5	1715	160K (158L)	N	Cold	15.5	4	1100	3	125	240		5.43	
385/65R22.5	2215	160K (158L)	N	Cold	15.5	4	2000	1.5	95	480	80.0	5.44	3.36
385/65R22.5	1715	160K (158L)	N	Cold	15.5	4	2000	1.5	95	480	80.5	5.56	
385/65R22.5	2715	160K (158L)	N	Cold	15.5	4	2000	1.5	95	480		5.26	
385/65R22.5	2215	160K (158L)	N	Cold	15.5	4	2000	1.5	125	240		5.67	
385/65R22.5	2215	160K (158L)	N	Cold	15.5	4	2000	1.5	125	240		5.63	
385/65R22.5	1715	160K (158L)	N	Cold	15.5	4	2000	1.5	125	240		5.62	

RRC are expressed in N/kN

HSE is original tread depth in mm

Size	DOT CASING	L.I./S.I.	Original M+S (Y/N)	Process	HSE	P1 (remaining rubber)	P2 (Buffing radius)	P3 cushion gauge (mm)	P4 curing t° (°C)	P5 curing time (min)	Tyre weight (kg)	RRC Tire	RRC casing
385/65R22.5	2315	160 K (158 L)	N	Hot	15,5	1	1100	1,5	135	110	78,0	5,3	2,95
385/65R22.5	2215	160 K (158 L)	N	Hot	15,5	1	1100	1,5	135	110	77,5	5,4	
385/65R22.5	2315	160 K (158 L)	N	Hot	15,5	1	1100	1,5	135	110	78,0	5,3	
385/65R22.5	1715	160 K (158 L)	N	Hot	15,5	1	1100	1,5	160	145	78,0	6,7	
385/65R22.5	1715	160 K (158 L)	N	Hot	15,5	1	1100	1,5	160	145	77,5	6,8	
385/65R22.5	1715	160 K (158 L)	N	Hot	15,5	1	1100	1,5	160	145	77,5	6,8	
385/65R22.5	2215	160 K (158 L)	N	Hot	15,5	1	2000	3	135	110	79,0	5,2	3,45
385/65R22.5	2615	160 K (158 L)	N	Hot	15,5	1	2000	3	135	110	79,0	5,3	
385/65R22.5	1415	160 K (158 L)	N	Hot	15,5	1	2000	3	135	110	79,5	5,4	
385/65R22.5	1715	160 K (158 L)	N	Hot	15,5	1	2000	3	160	145	80,5	6,9	
385/65R22.5	1915	160 K (158 L)	N	Hot	15,5	1	2000	3	160	145	80,5	6,9	
385/65R22.5	1915	160 K (158 L)	N	Hot	15,5	1	2000	3	160	145	80,0	6,8	
385/65R22.5	2215	160 K (158 L)	N	Hot	15,5	4	1100	3	135	145	77,5	5,3	2,95
385/65R22.5	2815	160 K (158 L)	N	Hot	15,5	4	1100	3	135	145	77,5	5,4	
385/65R22.5	2615	160 K (158 L)	N	Hot	15,5	4	1100	3	135	145	79,0	5,4	
385/65R22.5	2615	160 K (158 L)	N	Hot	15,5	4	1100	3	160	110	76,5	6,6	
385/65R22.5	1915	160 K (158 L)	N	Hot	15,5	4	1100	3	160	110	77,5	6,8	
385/65R22.5	1715	160 K (158 L)	N	Hot	15,5	4	1100	3	160	110	77,5	6,7	
385/65R22.5	2315	160 K (158 L)	N	Hot	15,5	4	2000	1,5	135	145	81,0	5,6	3,36
385/65R22.5	2215	160 K (158 L)	N	Hot	15,5	4	2000	1,5	135	145	81,0	5,4	
385/65R22.5	2215	160 K (158 L)	N	Hot	15,5	4	2000	1,5	135	145	80,7	5,5	
385/65R22.5	1915	160 K (158 L)	N	Hot	15,5	4	2000	1,5	160	110	81,5	6,8	
385/65R22.5	1715	160 K (158 L)	N	Hot	15,5	4	2000	1,5	160	110	81,5	6,9	
385/65R22.5	1915	160 K (158 L)	N	Hot	15,5	4	2000	1,5	160	110	81,0	6,9	

RRC are expressed in N/kN

HSE is original tread depth in mm

9.4. DESIGN OF EXPERIMENT "PROCESS IMPACT" DATA FOR TYRE ROLLING SOUND AND WET GRIP

	Experiment	Process	Size	WGI	WET grade	Noise	Noise label waves	HSE	Pattern	P1 (remaining rubber)	P2 (Buffing radius)	P3 cushion gauge (mm)	P4 curing t° (°C)	P5 curing time (min)	Tyre weight (kg)
1	Cold	315/80R22.5	92	D	76	3	21	1	1	800	1.5	95	240	72	
2	Cold	315/80R22.5	90	D	76	3	21	1	1	800	1.5	125	480	73.5	
3	Cold	315/80R22.5	86	D	74	2	21	1	1	2000	3	95	240	76	
4	Cold	315/80R22.5	88	D	74	2	21	1	1	2000	3	125	480	76	
5	Cold	315/80R22.5	87	D	78	3	21	1	4	800	3	95	480	75	
6	Cold	315/80R22.5	88	D	78	3	21	1	4	800	3	125	250	75	
7	Cold	315/80R22.5	93	D	75	2	21	1	4	2000	1.5	95	480	75	
8	Cold	315/80R22.5	94	D	74	2	21	1	4	2000	1.5	125	240	76	
1	Hot	315/80R22.5	112	B	77	3	22	2	1	800	1.5	135	110	77.5	
2	Hot	315/80R22.5	114	B	76	3	22	2	1	800	1.5	160	145	78	
3	Hot	315/80R22.5	109	B	77	3	22	2	1	2000	3	135	110	79	
4	Hot	315/80R22.5	110	B	77	3	22	2	1	2000	3	160	145	79.5	
5	Hot	315/80R22.5	117	B	76	3	22	2	4	800	3	135	145	78	
6	Hot	315/80R22.5	119	B	75	2	22	2	4	800	3	160	110	78	
7	Hot	315/80R22.5	112	B	77	3	22	2	4	2000	1.5	135	145	0	
8	Hot	315/80R22.5	Not tested. Damaged				22	2	4	2000	1.5	160	110	82	
1	Cold	385/65R22.5	128	A	68	1	15.5	3	1	1100	1.5	95	240	77.5	
2	Cold	385/65R22.5	125	A	69	1	15.5	3	1	1100	1.5	125	480	79	
3	Cold	385/65R22.5	118	B	69	1	15.5	3	1	2000	3	95	240	80.5	
4	Cold	385/65R22.5	111	B	69	1	15.5	3	1	2000	3	125	480	80.5	
5	Cold	385/65R22.5	120	B	69	1	15.5	3	4	1100	3	95	480	79.5	
6	Cold	385/65R22.5	118	B	70	1	15.5	3	4	1100	3	125	240	81	
7	Cold	385/65R22.5	120	B	70	1	15.5	3	4	2000	1.5	95	480	80	
8	Cold	385/65R22.5	124	B	70	1	15.5	3	4	2000	1.5	125	240	0	
1	Hot	385/65R22.5	131	A	71	2	15.5	4	1	1100	1.5	135	110	78	
2	Hot	385/65R22.5	130	A	71	2	15.5	4	1	1100	1.5	160	145	78	
3	Hot	385/65R22.5	112	B	71	2	15.5	4	1	2000	3	135	110	79	
4	Hot	385/65R22.5	129	A	71	2	15.5	4	1	2000	3	160	145	80.5	
5	Hot	385/65R22.5	122	B	71	2	15.5	4	4	1100	3	135	145	77.5	
6	Hot	385/65R22.5	127	A	71	2	15.5	4	4	1100	3	160	110	0	
7	Hot	385/65R22.5	119	B	71	2	15.5	4	4	2000	1.5	135	145	81	
8	Hot	385/65R22.5	132	A	71	2	15.5	4	4	2000	1.5	160	110	81.5	