

Issued: 10.2.2021	Entry into force: 1.7.2021	Validity: until further notice
Legal basis: Vehicles Act (82/2021), sections 16(7), 44(5), 48(5), 49(3) and 66(8).		
Implemented EU legislation:		

Modification details:
Section 7 (transitional provisions) in the EN version is revised on 11.3.2021 by correcting mismatch of paragraph 5 (A tyre-stud combination or a stud for which...) in relation to FI version and arrangement of paragraphs 3 and 4 is changed with each other. Corrected 21.4.2021: references to studded tyres for bicycles in points 1 and 3 has been modified.

Technical requirements for and type-approval of studded tyres for vehicles

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1 Scope of application

With this Regulation, the Finnish Transport and Communications Agency issues on the basis of the Vehicles Act (82/2021) the provisions on the technical requirements for studs and studded tyres permitted for use in road traffic and on the technical methods used to demonstrate the compliance of studs. In addition, this Regulation lays down further provisions for type-approval concerning the procedures for monitoring the conformity of production, the reports issued by recognised experts, and the contents of test certificates.

This Regulation applies to the type-approval of studs used in the tyres of category M and N vehicles and their trailers as well as the type-approval of studded tyres used in the aforementioned vehicle categories. In addition, the Regulation is applied when ensuring the conformity of production of the studs and studded tyres in question. The general requirements specified in this Regulation concerning studded tyres and their studs apply to all tyres intended for road use, unless the stud or tyre-stud combination has been separately type approved in accordance with this Regulation. The requirements of the Regulation are not applied, however, where studs or studded tyres are to be used in a bicycle or the trailer of a bicycle, tractor with a maximum design speed of 40 km/h, machines, or the trailer of a tractor or a machine.

The granting of type-approval is subject to the condition that the applicant for approval presents a test report that has been written by a recognised expert on the fulfilment of the requirements of this Regulation for either the tyre-stud combination or, alternatively, the stud type used in the tyre. For Class C3 tyres, type-approval may be granted only to the type of stud used.

2 Definitions

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

(1) a *stud* is a piece of equipment designed to be used on a vehicle tyre and may be fitted to the tread of the tyre either when the tyre is manufactured or after that. Its purpose is to improve the traction of the tyre on icy surfaces;

2) a *studded tyre* is a vehicle tyre with studs attached to its tread

3) *road wear test* means the testing of a studded tyre in accordance with the standard SFS 7503:2018:en or with a measurement procedure that fulfils the national requirements equivalent to that standard laid down by a Member State of the European Economic Area;

4) *tyre rolling circumference* means the distance (m) travelled by a new, loaded tyre in one revolution as defined in the relevant publication of the European tyre standards organisation referred to in Annex 6, Appendix 4 of UN Regulation No. 117;

5) *stud protrusion* means the perpendicular distance (mm) between the parallel levels determined by the tread surface around the stud installed in a tyre and the outermost tip of the stud;

- 6) *static stud force* means the force applied to the probe when the measuring device is pressed perpendicular to the tip of a stud in a tyre until the stud has sunk to the level of the tyre tread surface;
- 7) *test stone* means a piece of stone used in a road wear test that is exposed to the wear caused by studded tyres during the test;
- 8) *reference stone* means a piece of stone that is used as a baseline for test stones in a road wear test; during the test, the reference stone is stored underwater in a container and is not exposed to the wear caused by the studded tyres;
- 9) *passenger car tyre* refers to the types of Class C1 tyres specified in UN Regulation No. 117, 02 series of amendment;
- 10) *commercial vehicle tyre* refers to the types of Class C2 or C3 tyres specified in UN Regulation No. 117, 02 series of amendment;
- 11) *tyre–stud combination type* means, in connection with the type-approval of studded tyres, a range of tyre–stud combinations where the studded tyres do not differ in the following essential characteristics:
- a) name of tyre manufacturer;
 - b) tyre class (C1 or C2);
 - c) tyre structure, if the difference would have an unfavourable effect on road surface wear;
 - d) tread pattern model;
 - e) stud type and model name;
 - a. stud fabrication materials;
 - b. main dimensions and masses of the studs;
 - f) maximum number of studs per one metre of tyre rolling circumference in the tyre sizes covered by the type of tyre–stud combination;
 - g) target protrusion for stud installation;
- 12) *stud type* refers to studs that do not differ in the following essential characteristics:
- a) model name;
 - b) name of manufacturer;
 - c) fabrication materials;
 - d) dimensions;
 - e) mass;
- 13) *Framework Regulation* refers to Regulation (EU) 2018/858 of the European Parliament and of the Council on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, amending Regulations (EC) No 715/2007 and (EC) No 595/2009 and repealing Directive 2007/46/EC.

3 General requirements for studded tyres and studs that are not required to be type approved

The requirements of this paragraph shall apply unless regulatory approval is required for studs or tyre-stud combinations.

A studded tyre may include a maximum of 50 studs per one metre of tyre rolling circumference. A tyre designed for a category L vehicle or a light electric vehicle or a trailer for such vehicles may, however, have a maximum of 100 studs per one metre of tyre rolling circumference. The mass of studs inserted into a tyre to be used in a vehicle with a maximum classification mass of 3,500 kg or less must not exceed 3.0 g. In this case average protrusion of studs when installed in the tyre must not exceed 2.0 mm. Similarly, the mass of studs inserted into a tyre to be used in a vehicle with a maximum classification mass of more than 3,500 kg must not exceed 5.0 g and the average protrusion of the studs when installed in the tyre must not exceed 2.5 mm.

4 Type-approval of studded tyres

4.1 Tyre–stud combination requirements, testing and limit values

The type-approval of tyre–stud combinations for class C1 tyres for passenger cars and Class C2 tyres for commercial vehicles is based on a road wear test conducted in accordance with the standard SFS 7503:2018:en, or with a measurement procedure that fulfils the national requirements equivalent to that standard laid down by a Member State of the European Economic Area, unless otherwise specified below or in Annex 1. All measurement results are to be reported in accordance with the model report in Annex 4.

The type-approval of a tyre–stud combination requires that, based on a test report prepared by a recognised expert who has been appointed for the tests in question, it can be determined that the tyre–stud combination complies with the requirements specified in this Regulation. The type-approval process for tyre–stud combinations utilises the applicable road wear test limit values, set out in Table 1, for the tyre load capacity (LI category) in question.

The holder of the type-approval must ensure that all variations of and the quality of the studding used in the tyre–stud combination of said type that it manufactures meet the requirements of this Regulation.

Table 1 Maximum permissible road wear during the different phases of the implementation of the Regulation (reference-corrected average value of test stone wear per row):

Tyre load capacity	phase A (200 overruns)	phase A+ (200 overruns)
Load rating under 600 kg	0.9 g	Least favourable tyre option: Limit value [g] = (0.0152 * LI) - 0.4848
Load rating 600–800 kg	1.1 g	
Load rating over 800 kg	1.4 g	
Class C2 tyre	1.8 g	Least favourable tyre option: Limit value [g] = (0.0076 * LI) + 0.7

The primary requirement is that the results of the road wear test must be at least 10 per cent below the permissible maximum limit value for road wear specified in Table 1. In other cases, the granting of type-approval requires that the road wear test results of two consecutive tests for the tyre–stud combination in question does not exceed the maximum permissible value for road wear.

The minimum, maximum and average stud forces of the studs used in the tyres that are to be tested must be measured before the road wear measurement but after the stud protrusion test preceding it. The measurement conditions and measurement procedures must be the same as those specified in section 5.2, subsections a.5., a.6., b.1.–b.3. When measuring the stud forces, the tyre pressure must be as shown in Table 1 of standard SFS 7503:2018:en.

Phase A requirement compliance and limit values:

For the type-approval that is in accordance with the limit values applied in phase A of the implementation of this Regulation (Table 1), the tyres that represent the most common tyre size on the market, specified in Annex 1, will be tested for each load capacity range covered by the studded tyre in question.

Phase A+ requirement compliance and limit values:

In a road wear test that is conducted according to the limit values specified for phase A+ (Table 1), the vehicle used in the test may only be powered by its front axle. When testing class C2 tyres for commercial vehicles, however, a vehicle only powered by its rear axle may also be used in the test.

For the type-approval that is in accordance with the limit values applied in phase A+ of the implementation of this Regulation, the test must be performed on at least one alternative to the tyre–stud combination assessed to be the least favourable for the road wear test. The type-approval is granted on the basis of the measurement results of the least favourable alternative.

The tyre that is considered the least favourable alternative for the road wear test is the tyre of the same tyre–stud combination type with the highest number of studs per metre of tyre rolling circumference, unless some other tyre is assessed to be less favourable by a recognised expert or the type-approval authority. In any such case where, based on the number of studs mentioned above, a test tyre need be selected from two or more tyre sizes in the same tyre class, the selected tyre must represent the size and load capacity rating estimated to have the highest number of studded tyres in use on Finnish roads in winter at the time of the type-approval.

4.2 Type-approval markings on tyres and extending an approval

Before a type-approved tyre–stud combination is placed on the market, it must be fitted with an Annex 3-compliant type-approval sticker on the side or tread of the tyre, and said sticker must contain the markings for the type-approval in question. Misleading and unfounded type-approval markings are prohibited. The sticker may be removed when the tyre–stud combination is mounted onto the rim.

The type-approval of a tyre–stud combination may be extended upon separate application if the extension will not cause the tyre–stud combination type to change.

4.3 Ensuring the conformity of production

The procedures for ensuring the conformity of the production of the tyre–stud combination subject to type-approval must be those laid down in the Framework Regulation and its Annex IV, and in Annex 2 of this Regulation.

5 Type-approval of studs

5.1 Type approved stud requirements and number of studs

In this section of the Regulation, a studded tyre may include a maximum of 50 studs per one metre of tyre rolling circumference.

In phase A of the implementation of this Regulation, the type-approval issued to a stud requires that, for passenger car tyres, the static stud force measured with a protrusion of 1.2 mm may be a maximum of 120 N and the mass of the stud a maximum of 1.1 g. For a Class C2 tyre for commercial vehicles, the aforementioned stud force may be a maximum of 180 N and the mass a maximum of 2.3 g, and for a Class C3 tyre for commercial vehicles, 340 N and 5.0 g respectively when measured with a protrusion of 1.5 mm.

In phase A+ of the implementation of this Regulation, the type-approval of a stud requires that, for passenger car tyres, the static stud force measured with a protrusion of 1.2 mm may be a maximum of 120 N and the mass of the stud a maximum of 1.0 g. For a Class C2 tyre for commercial vehicles, the aforementioned stud force may be a maximum of 180 N, measured with a protrusion of 1.2 mm, and the mass a maximum of 2.1 g. For a Class C3 tyre for commercial vehicles, stud force may be a maximum of 340 N and mass 5.0 g respectively when measured with a protrusion of 1.5 mm.

Stud masses, stud forces and protrusions must be measured by a recognised expert with measuring equipment that is considered sufficient and appropriate as well as an approved level of competence to perform the measurements.

5.2 Measuring the stud force of a passenger car tyre stud

The stud force of passenger car tyre studs is measured with studs that have been appropriately installed in passenger car winter tyres of two different brands designed for studs of the size being measured. A recognised expert selects two tyres from both tyre brands for measurement so that one of the tyres has a maximum load capacity of 600 kg and the other exceeding 600 kg.

The tyre with a maximum load capacity of 600 kg will be selected from the following sizes: 175/65/R14 or 185/60/R15.

The tyre with a maximum load capacity exceeding 600 kg will be selected from the following sizes: 195/65R15 or 205/55R16.

Before the tyres are delivered to the recognised expert, they must be fitted on rims recommended for the tyre size in question in the appropriate publication of a European standardisation association referred to in Annex 6, Appendix 4 of UN Regulation No. 117. The tyres that will be used in the measurements must have been manufactured at least 2 weeks before being studded.

The measurements must be conducted in standardised conditions that are subject to the following prerequisites:

- a.1. stud protrusion is measured before the measurement of stud force; the protrusion must be 1.2 ± 0.1 mm;
- a.2. the pressure of the tyre must be $2.0 \text{ bar} \pm 0.1 \text{ bar}$;
- a.3. the technical service or recognised expert will perform or supervise the installation of the studs that are to be measured;
- a.4. the measurements must take place one week at the earliest and two weeks at the latest after studding;
- a.5. the temperature in the measurement facility must be 20 ± 2 °C;
- a.6. 20 consecutive studs are to be measured from the entire width of the tread, unless there is a specific reason for measuring studs from a more extensive area.

The measurements are to be conducted in the following manner:

- b.1. the wheel is subjected to a load that is equal to 70 ± 1 per cent of the tyre's load capacity;
- b.2. the load is applied parallel to the tyre radius travelling through the stud and perpendicular to a level surface representing the road surface;
- b.3. the measurements are taken statically when the stud tip is sunk to the tyre tread level, parallel to the load.

The stud force of a tyre's studs is the average value of the forces measured in the aforementioned manner. The protrusion is the average value of the measured stud protrusions. If the protrusion does not comply with the value prescribed in section 5.1, the stud force (N) is defined as follows:

$$F = F_m * u_s / u_m, \text{ where}$$

F_m = average value of measured stud forces

u_s = permissible average value of a protrusion

u_m = average value of measured protrusions

The purpose of the type-approval process is to check that the average value of the stud forces of the four tyres that have been measured in the aforementioned manner does not exceed the stud force that has been permitted for the stud.

5.3 Measuring the stud force of a commercial vehicle tyre stud

The stud force of Class C2 or C3 commercial vehicle tyre studs is measured using one tyre with appropriately installed studs or as the average value using several tyres. The size of a Class C2 commercial vehicle tyre is 195/70/R15C and the size of a Class C3 tyre is 295/80R22.5, or the closest equivalent to these sizes. A recognised expert will select the test tyres from the tyres manufactured by common brands that have been designed for studs of the size being measured.

The measurements must be conducted in standardised conditions that are subject to the following prerequisites:

- 1) stud protrusion is measured before the measurement of stud force; the protrusion must be 1.2 ± 0.1 mm for Class C2 tyres and 1.5 ± 0.2 mm for Class C3 tyres;
- 2) the tyre pressure in Class C2 tyres must be 3.0 ± 0.1 bar, and in Class C3 tyres the tyre pressure must correspond to the test pressure in Regulation 54, 03 series of amendment;
- 3) if necessary, stud holes can be drilled in the Class C3 tyre according to the applicant's instructions, and the studs must be installed by the recognised expert or by the applicant under the supervision of the recognised expert.

The stud force measuring conditions must correspond to those specified in section 5.2, and the measurements and possible calculations are to be performed in accordance with the principles laid down in section 5.2.

5.4 Type-approval markings on tyres and extending an approval

Before placing on the market a Class C1, C2 or C3 tyre that has been studded with type-approved studs, it may be fitted with an Annex 3-compliant type-approval sticker on the side or tread of the tyre, and said sticker must contain the markings for the type-approval in question. Misleading and unfounded type-approval markings are prohibited.

The type-approval of a stud may be extended upon separate application if the extension will not cause the stud type to change.

5.5 Ensuring the conformity of production

The procedures for ensuring the conformity of the production of the studs subject to type-approval must be those laid down in the Framework Regulation and its Annex IV, and in Annex 2 of this Regulation.

6 Applying for the type-approval of a stud or tyre–stud combination

The type-approval application must specify the following:

- 1) Name and address of the tyre manufacturer and the corresponding information on the stud manufacturer
- 2) Name and address of the manufacturer's representative
- 3) Make and commercial names of the product subject to type-approval

The application must be appended with at least the following documents and samples:

- 1) A test report prepared by a recognised expert that includes a technical drawing of the stud and the specifications concerning the stud's materials and design weight;
- 2) for tyre–stud combinations, the list of companies that perform the studding and the locations and contact details of their studding plants;
- 3) Reference samples of the studs included in the application - at least 10 for each stud model.

7 Transitional provisions and the provision of providing information concerning the standard

The road wear test limit values and the maximum stud mass permitted in the type-approval of studs specified in phase A of the implementation of this Regulation will apply to Class C1 passenger car tyres manufactured before 1 January 2027 and to Class C2 and C3 commercial vehicle tyres manufactured before 1 January 2029.

The road wear test limit values and the maximum stud mass permitted in the type-approval of studs specified in phase A+ of the implementation of this Regulation will apply to Class C1 passenger car tyres manufactured on or after 1 January 2027 and Class C2 and C3 commercial vehicle tyres manufactured on or after 1 January 2029.

The road wear test limit values and the maximum stud mass permitted in the type-approval process in phase A+ will apply to a tyre-stud combination of a new type or a new stud type when applying for type-approval for class C1 tyres for passenger cars on or after 1 January 2025 or when applying for type-approval for class C2 or C3 tyres for commercial vehicles on or after 1 January 2027.

The requirements for ensuring the conformity of production specified in subsections 4.3 and 5.5 must be met if the type-approval of a tyre–stud combination or a stud is applied for a new type on or after 1 January 2025.

A tyre-stud combination or a stud for which type-approval has been granted pursuant to the statutes valid at the time of the entry into force of this Regulation may continue to be placed on the market if the Class C1 tyre used for a studded tyre has been manufactured before 1 January 2027 or if a Class C2 or Class C3 tyre

has been manufactured before 1 January 2029. If a tyre other than a C1, C2 or C3 tyre has been manufactured before 1 January 2022, the studded tyre may continue to be placed on the market if the stud and the studded tyre meet the requirements of the statutes and regulations that were in force when the tyre was manufactured, or those of later statutes and regulations.

By way of derogation from the above, all type-approved tyre–stud combinations placed on the Finnish market are required to be fitted with a type-approval markings in accordance with section 4.2 if the tyre has been manufactured on or after 1 January 2025. In addition, if in the type-approval of tyre–stud combinations or studs the requirements for ensuring conformity of production have not been demonstrated, the placing on the market of such studded tyres shall be permitted only if the tyre has been manufactured before 1 January 2027.

An application regarding the area of competence of a recognised expert for testing tyre–stud combinations and studs in accordance with this Regulation may be submitted and processed before this Regulation enters into force.

Upon request, the Finnish Transport and Communications Agency can provide information on the standard referred to in this Regulation in Finnish and Swedish, as the standard is only available in English and has not been published in Finnish or Swedish.

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Annex 1 Detailed requirements for road wear measurements

Test tyres

The unused test tyres must be mounted on the test vehicle in accordance with their designated rotation direction as the front left and rear left tyres of the vehicle. The test tyres must not be subjected to any run-in before the road wear test.

When performing tests on a tyre-stud combination, the tyre sizes listed below are to be used as test tyres in every load capacity range represented by the tyre type as part of the verification of the fulfilment of phase A limit values. The list below first shows the tyre size to be used in the measurements and then, in an order of preference, the alternative tyre sizes that may be used if the primary tyre sizes are not available:

Load capacity rating under 600 kg:

1) 175/65R14, 2) 185/60R15, 3) 195/55R16

Load capacity rating 600–800 kg:

1) 195/65R15, 2) 205/55R16, 3) 225/45R17

Load capacity rating over 800 kg:

1) 235/65R17, 2) 255/55R18, 3) 255/50R19

Load capacity rating "C2 tyre":

1) 195/70R15C, 2) 215/65R16C, 3) 225/65R16C, 4) LT225/75R16, 5) LT265/70R17.

If the tyre sizes listed above are not available at the time of testing, another representative tyre with the same load capacity rating that is the closest equivalent may be tested.

Changes in test tyre stud protrusions during road wear tests

The average stud protrusion of the test tyres after the test may not deviate from the average stud protrusion measured before the over-run test by more than +/- 25 per cent when the stud protrusion is measured in accordance with the standard SFS 7503:2018:en.

The average value of stud protrusion in test tyres = (average stud protrusion of the test tyres on the front axle + average stud protrusion of the test tyres on the rear axle) / 2.

Additional requirements for the test stones and reference stones used in the test

The test and reference stones used in the test must be manufactured from the same excavation batch and their grooving must be implemented in accordance with Figure 1 in the standard SFS 7503:2018:en. In each road wear test, the test stones must be of the same height and belong to the same sorting batch. The height difference between the stones must not exceed 0.5 mm.

Reference correction

The calculated correction of road wear results is conducted in the manner specified in the aforementioned standard. The road wear result is corrected in proportion to the average change in mass that has occurred as part of the drying process that the five previously unused reference stones, stored underwater in a container for the duration of the test drives, were subjected to.

Annex 2 Ensuring the conformity of production and measures implemented for this purpose

1. Initial assessment

1.1 By way of derogation from the requirements specified in Annex IV to the Framework Regulation, the initial assessment may alternatively be carried out by assessing the manufacturer's quality system documents.

2. Product conformity arrangements

2.1 Every stud or tyre–stud combination that is approved in accordance with this Regulation must be manufactured in a manner that it conforms to the approved type and fulfils the requirements of this Regulation.

2.2 Before granting a type-approval in the manner specified in this Regulation, the type-approval authority must verify the existence of sufficient product conformity arrangements and documented control plans, to be agreed with the manufacturer for each approval, so that the tests or associated checks that are necessary for the verification of the continued conformity with the approved type, including, where applicable, the tests specified in this Regulation, can be carried out at specified intervals.

2.3 In particular, the holder of the type-approval must:

2.3.1 ensure that procedures are in place to effectively monitor and apply the compliance of studs or tyre–stud combinations with the approved type;

2.3.2 have access to the testing or other appropriate equipment necessary for checking the conformity of each approved type;

2.3.3 ensure that the data resulting from the tests or checks are recorded and that their appended documents remain available for a period which is determined with the approval authority and which may not exceed 10 years;

2.3.4 analyse the results of each type of test or check, in order to verify and ensure the stability of the product's characteristics while allowing for the variations inherent to industrial production;

2.3.5 ensure that, at minimum, stud protrusion control measurements are carried out in the production process to ensure the quality of the production of each tyre–stud combination type. These measurements must cover at least 0.02 per cent of the annual production volume of each tyre size manufactured for each tyre–stud combination. However, these measurements must be carried out annually on at least two tyres per each manufactured tyre size. The results of quality assurance measurements and tests must be reported to the approval authority annually or within two weeks if any non-compliances are detected in the measurements or tests;

2.3.6 ensure that, whenever any samples or test items are shown to be non-compliant for the test type in question, a new sampling and test run is performed. In such cases, all necessary procedures must be implemented to restore the compliance of the production process with the approved type.

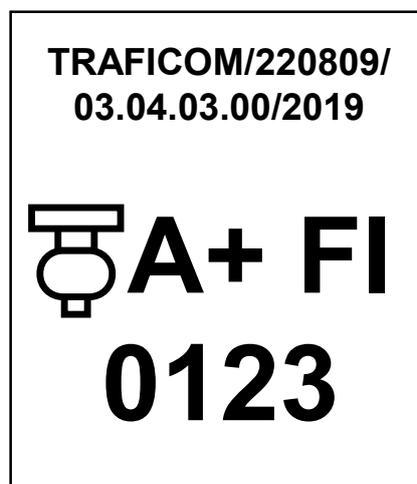
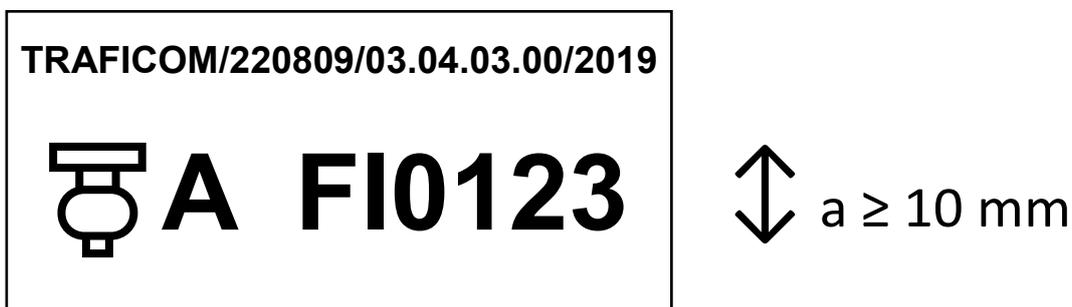
Annex 3 Type-approval markings on a studded tyre

A rectangular sticker of at least 35 cm² must be affixed on the outer side of the tyre to its side or tread, and the sticker must contain a clearly legible type-approval mark that meets the following requirements:

- 1) Reference to the Regulation laying down the type-approval requirements;
- 2) a drawing of the stud and the national identifier of the type-approval (black markings);
- 3) the four-digit sequential number of the type-approval (black markings);
- 4) the background colour of the label is white, and a phase identifier (A or A+) is marked on the label to indicate the application phase whose requirements the tyres and studs meet.

The markings specified in sections 2–3 are to be made with characters that are at least 10 mm in length. In the case of a type-approval of a stud or the type-approval of a tyre–stud combination that was granted before this Regulation entered into force, the entries in sections 2–3 may be replaced with an alternative, applicable type-approval identifier, e.g. FIN-NA-200x-0x. The markings may be placed on the same label with the manufacturer’s other markings, eliminating the need for a separate label.

Examples of the type-approval marks used on labels:



Annex 4 Model test report

TEST REPORT No:		Recognised expert code:	
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Test tyre information

Size, LI code, speed class		
Approval markings (UN ECE R30 or R54)		
Approval markings (UN ECE R117)		
Week of manufacture	Front tyre [week no]	Rear tyre [week no]
Number of studs in tyre	Front tyre [number]	Rear tyre [number]
Number of studs / 1 m of tyre rolling circumference	Front tyre [number/m]	Rear tyre [number/m]

Stud measurements (average of 10 measured studs) and materials and stud forces

Length [mm]		Stud forces [N]	Minimum	Maximum	Average
Bottom flange dimension [mm]		Front tyre			
Stud tip protrusion from body [mm]		Rear tyre			
Mass in grams [g]					
Stud body material					

Measured stud protrusions [mm] of new test tyres and variation related to target protrusion

Protrusions as new [mm]	Minimum	Maximum	Average	Target protrusion [mm]	
Front tyre				Protrusion variation	Average of 2 tyres
Rear tyre				Variation average [mm]	-
Both - average				Variation average [%]	+/- 10%

Variation with individual stud protrusion [mm] and control of protrusions – new test tyres

Difference in minimum and average stud protrusion [mm]		Limit value	Difference in maximum and average stud protrusion [mm]		Limit value
Difference [%]		- 30 %	Difference [%]		+ 30%
Minimum vs. average if target protrusion is under 0.5 mm [mm]		- 0.1 mm	Maximum vs. average if target protrusion is under 0.5 mm [mm]		+ 0.1mm

Measured stud protrusions on test tyres after test [mm] and change in protrusions during the test

Protrusion after the test	Minimum	Maximum	Average	Change during the test [%]	Limit value
Front tyre					-
Rear tyre					-
Both - average					+/- 25%

Test vehicle load by axle

Load by tyre	Mass [kg]	Mass [%]	Load limits	Allowed difference	Load difference [%]	Limit value
Front tyre left			60-80%	Front axle; left / right		< 5 %
Front tyre right			60-80%	Rear axle; left / right		< 5 %
Rear tyre left			60-80%	Front axle / Rear axle		< 5 %
Rear tyre right			60-80%			
All tyres total			65-75%			

Test conditions and background information

Test site and date				Weather : Sunny / Cloudy / Rain	
Test car make and model				Driving axle(s): front / rear / 4-wheel	
Ambient temp [°C]	start:	middle:	end:	limitation +2 ... +20 °C	
Test track temp [°C]	start:	middle:	end:	limitation +2 ... +25	

Results

Measured wear in test stone rows 1 / 2 / 3 [mm]	Row 1	Row 2	Row 3
Row wear without reference correction [g]			
Row wear with reference correction [g]			

Confidence interval and ref. correction of results	% calculated	Limit value
95% confidence interval [%]		Max 15 %
Change in mass of reference stones [%], average		Max 0.025 %

Summary of results (average row wear) [g]		Row wear limit value [g]:	
Row wear ratio to limit value [%]		Re-test requirement if row wear ratio differs from limit value by -10%...0%	

Notes on the test

Before the road wear test, conduct the measurements for assessing the average value of stud protrusions before conducting the stud force measurements. The protrusion of any stud must not differ more than $\pm 30\%$ from the measured average protrusion. The average value of stud protrusions must not differ more than $\pm 10\%$ from the target value set by the tyre manufacturer.

After the road wear test, the protrusions are measured from the test tyres that crossed over the stone samples in the full test. The average stud protrusion value after the over-run test must not differ more than $\pm 25\%$ from the average protrusion measured prior to the test.

Compiling the test report

The test report must include a cover page that contains at least the following information:

- 1) the diary number of the regulation according to which the test was performed;
- 2) information on the tested tyres (make, manufacturer) and studs (make or type, manufacturer) and the load capacity index categories of the tyres (LI < 90 (under 600 kg), $90 \leq LI \leq 100$ (600–800 kg) or $LI > 100$ (over 800 kg) or the LI of the least favourable tyre);
- 3) information on the recognised expert who performed the tests;
- 4) information on whether the relevant requirements have been met;
- 5) date and signatures;
- 6) table of contents.

In addition to the above, the appendices to the report must include:

- 1) drawings or photos of the tread patterns of the tyres
- 2) a dimensional drawing of the stud, including information on the design weight and materials of the stud
- 3) justifications used to select the least favourable tyre in the over-run test, if applicable

The appendices must be marked either with the number of the test report or sequential page numbering to make it clear that they are part of the report.