PERSPECTIVE DEMANDS TO TIRES

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Questions in the field of the international standardization of pneumatic tires are considered. The composition of Global Technical Rules - GTR on tires is analyzed. The set of sized up properties of tires is presented.

Introduction

Escalating of volumes of output and expansion of the nomenclature of tires, exit on the international markets demands from Open Society "Belshina" of harmonization of republican system of certification and the European system (ECE the United Nations). It first of all touches methodology of tests of tires. Main routes of such work in system ECE the United Nations are observed below.

Appreciable atomization of activity of a special working commission of experts on a retardation and the running gear (GRRF) the World Forum for the coordination of Rules in the field of transport facilities (WP.29) is connected as pompously a task in view, and a certain lag in this direction at considerable volume of the spent time.

Objective difficulties in creation of the harmonized Rules on tires are defined by very strong technical traditions of two parallel directions of development of methodology of tests of tires - the European system (Economic Commission for Europe of the United Nations, ECE) and Standards of the USA on tires.

Nevertheless, long and numerous debates of experts on this point in question has shown that at a basic difference in demands to safety and operational properties of tires in both mentioned systems is not available. Among experts of contracting parties there are various alternatives of treatments and estimations of the significance of separate aspects of tests of tires, there are certain divergences in a concrete operation condition.

Most of all difficulties by search of the coordinated solutions have called parameters of an estimation of working capacity of tires on high speeds. However it has not prevented to create by this time the coordinated harmonized design of Global rules on tires as which many experts consider definitive.

Composition of Global Technical Rules - GTR on tires (Set of sized up properties).

1. If to speak about composition of Global Technical Rules - GTR on tires, about a set of sized up properties of tires it is possible to tell that its volume in this sense is minimum and farly insufficient completely to size up agency of tires on operational properties of the car. However, a design positive side is that all chosen for turning on in GTR aspects of tests of tires, regimes and conditions are the coordinated all finishing speaking parties of global agreement 1998.

2. One of the most complicated questions still has the coordination of scope GTR on tires. For today extending GTR on the radial tires for cars a lump of 4536 kg is coordinated, i.e. all enter into service area GTR on tires automobile and easily lorry tires.

3. Has undressed definition of concepts it is based on the known terms accepted in previous Rules ECE of the United Nations on tires.

4. The basic demands to tires contain 12 positions which embrace all gammas of the coordinated parameters of tires which are switched on in GTR on tires.

4.1. The system of registration of a code of the manufacturer of tires is based on accepted and acting now American (USA) a procedure for registration through NHTSA (National Administration of safety of traffic). Though all experts recognize that, and this order demands essential modernization regarding necessity of a heading of the system approach to classification and streamlining of given out codes.

4.2. As to marking of tires Contracting parties, will accept either own certification of the producer or official state assertion of the typical sample and to specify conformity to three modules: obligatory for all contracting parties, or conformity of tires to facultative modules And in which are applied at the discretion of the parties. The maintenance of modules is shown in table 1.

Table 1

<table>
<tr><td rowspan="2">The obligatory
Physical sizes
Demanded marking
Test for a high speed
Fatigue test
Test for low pressure
Bond test on wet road</td><td>Module "A"
Test for shift from a rim shelf
Test for a tire crushing energy by plunger</td></tr>
<tr><td>Module "B”
Test for the noise at rolling motion</td></tr>
</table>

The tires which completely are meeting the requirements of all three modules (table 1), have the right to be marked by a pictogram («the Global tire») G (letter G is shown as example). The country which has given out an official confirmation of the typical sample will be marked out by means of interlinear symbol G_4; G_{22}; etc. The tires which are answer the requirements of the obligatory module plus of modules "A" or "B", but not both together, are regional tires, and will be marked on a side member by regional pictogram R (the letter «R» is shown as example).

All regional tires should match to the obligatory module, besides for identification of their conformity to module "A" or "B" a sign «R» can have a subscript "A" or "B".

$$R^A \text{ or } R^B.$$

In case of a type official confirmation, identification number of the country which have given out an official confirmation of the typical sample, will be specified by a subscript at a sign

$$R_4^A \text{ or } R_{22}^B.$$

The general identification format GTR is shown in table 2.

Table 2

Identification format GTR
XXXXXXX_G4_YYY_MMMMMMMM_DDDD
XXXXXXX Number of an official confirmation of the typical sample [7 figures]
G4; (R4) New Global or Regional pictogram GTR With a facultative subscript of a code of the country [actual pictograms are subject to definition]
YYY a factory Code (increased with 2 to 3 figures (signs)
MMMMMMMM the Code of the producer (combines modern codes of standard sizes)
DDDD the Four-unit code of date
- A white space (6 mm - 19 mm)

The location of identification GTR is chosen on an outdoor part of a side member of the tire.

4.3. The demand to presence and sizes of the indicator of deterioration did not call disagreements, and demands to it remained at level of Rules №30 ЕЭК the United Nations, i.e. on the usual tire - 6 rows of indicators in altitude of 1, 6 mm + 0, 6 - 0, 0 mm.

4.4. Demands to measurements of sizes of tires in GTR are accepted completely by Rules №30 ЕЭК the United Nations.

4.5. The estimation of strength of tires at forcing through is based on the standard of USA ASTM F414-06, 19 mm are used plunger in diameter (3/4 “), depth of a heading of plunger and force at which there is a tire forcing through on a corona is defined.

Energy of forcing through is defined: $W = [(F-P)/2] \cdot 103$ (J).

4.6. Strength of landing of a tire bead on a rim shelf is defined under the standard of USA ASTM F2663-07a.

Method, conditions, regimes and norms on this parameter well-known, are tested and mastered. For a great bulk of tires the parameter of strength of landing of a tire bead on a rim shelf is not critical. Norms are resulted in table 3.

Table 3: Norm on the minimum force of shift of a board from a rim shelf

Nominal Section Width S mm	Minimum Force N
S<160	6 670
160≤S<205	8 890
S≥205	11 120

Nominal Section Width S code	Minimum Force N
S<6.00	6 670
6.00≤S<8.00	8 890
S≥8.00	11 120

4.7. Fatigue tests (working capacity) - a method for automobile tires new enough and interesting though is not rigid. Pressure 180/220 кPa matches for the standard and reinforced tires, speed of 120 km/hour, external temperature 38°C , diameter of a drum of 1,70 m.

Steps of radial loads are showed in tab. 4.

Table 4: Loading and productivity of a running-in of tires at fatigue tests

Test period	Duration	Load as a percentage of tire maximum load capacity
1	4 h	85%
2	6 h	90%
3	24 h	100%

4.8. The estimation of working capacity of tires on an reduced pressure is made on a drum of 1,7 m at pressure on ~25% less than the pressure, matching to max loading; environment temperature - 38°C, speed of 120 km/hour; loading of 100 %. The tire should stand this regime without destruction and defects, working within 1 hour.

It is new enough regime; on it at us not enough the experience, here again we are completely assumed on experience of specialists ETRTO and experts of Contracting parties.

4.9. The most difficult parameter at the coordination between the European and American systems is the estimation of working capacity of tires on high speeds. The compromise which has been found thanking, first of all force ETRTO, consists that methodically all circuit design of tests breaks into 2 sections, each of which matches to a certain class of speed. So, for tires with a class of speed S (180 km/h) or are less, tests are spent on the American system, i.e. pressure 220/260 кPa for the standard and reinforced tires accordingly; a drum of 1,70 m; loading - 85 % from maximum; ambient temperature - 38°C ; a preliminary running-in in a current 2 hours with a speed of 80 km/hour, and the basic regime: for 30 minutes on speeds 140, 150 and 160 km/hour then the tire should not have any defects.

For tires with a class of speed T (190 km/hour) and above, tests is spent by a technique and Rule regimes № 30 ECE the United Nations, since the speed on 40 km/hour are less - on a drum 1,70м and on 30 km/hour - on a drum 2,0м, than the set class of speed with the subsequent raise of speed on 10 km/h every 10 minutes and with a running-in of tires on the speed matching to the given class within 20 minutes with some variations in regimes for tires with a class of speed Y (300 km/hour) and more.
The tire is considered passed test of high-speed characteristics under load if after tests for it is not observed cord and tread separation, stratifications, отслоения on a cord, brakes-off of pieces of a tread and ruptures of filaments of a cord.

4.10. Tests according to noise of tires at rolling motion are completely based on a technique of Rules № 117 ECE the United Nations and those norms on parameters of noise of tires which are installed by the given rules. Norms on noise levels of tires are presented to tab. 5.

Table 5: As much as possible allowances of noise of tires under the set conditions and regimes of tests

Nominal Section Width	Limit dB (A)
145 and lower	72
Over 145 up to 165	73
Over 165 up to 185	74
Over 185 up to 215	75
Over 215	76

4.11. Definition of coupling properties of tires on a wet covering is based on the second part of the Rule № 117 ECE the United Nations without any changes or refinement of regimes and test

specifications. The accepted norms on levels of factors of the clutch of tires on a wet covering are resulted in tab. 6.

Table 6: Norm on parameters of coupling properties of tires on the wet covering

Category of use	Wet grip index (G)
show tire with a speed symbol ("Q" or below) indicating a maximum permissible speed not greater than 160 km/h	≥0.9
show tire with a speed symbol ("R" and above) indicating a maximum permissible speed greater than 160 km/h	≥0.9
Normal (road type) tyre	≥1.1

4.12. Tests according to working capacity of safety (self-supported) tires are accepted by Rules № 30 ECE the United Nations with the same criteria limiting extent of the radial deformation of the tire at a running-in on a drum with speed of 80 km/hour within 1(one) hour at environment temperature - 38°C, $[(Z_1 - Z_2) / Z_1 \times 100]$.

Conclusion

1. Approved design GTR on tires is the major step to development of questions of the coordination and harmonization of methods of a complex estimation of safety and quality of tires.

2. Regimes and the test specifications which have been switched on in GTR, have a row of methodical features, in communication, with what sampling and development of these regimes is a priority of verifiers of tires of all Contracting parties and first of all the test centers.

3. On this basis the system of tests and certification of domestic tires (JSC "Belshina") should develop.

4. It is necessary for JSC "Belshina" to spend a complex of organizational and standard provisions on adaptation of the presented international order to the nomenclature and a perspective type of tires.

5. The Further perfection GTR on tires should pass in a direction of refinement of composition of each module on a set of parameters of tires, and also in modernization of the order of representation of separate parameters of tires. Logical it is represented to issue all Global Rule by principles of the stated Modules, i.e.:

The first section - all obligatory demands;
The second section - demands of the module A;
The third section - demands of the module of B.

6. It is expedient to spend the further perfection of an order of coding taking into account necessity of introduction of principles of ordering and classification.
7. The offer of some Contracting parties about turning on of an estimation of coupling properties of tires on a wet surface in the additional module Is observed In which will be completely methodically provided by Rules № 117 ECE the United Nations.