



UNECE Regulation No 106

UNECE Regulation No 106 Presentation to the GRRF

February 2009 meeting

ETRTO Delegation

UNECE Regulation No 106



Agenda :

- Scope of the UNECE Regulation No 106
- Definitions
- Markings
- Requirements
 - Section width
 - Outer diameter
 - Resistance to burst – applies to all tyre types
 - Load / speed test – for category speed symbol D (65 km/h)
- Annexes
- Pending amendments

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Scope :

This Regulation covers new pneumatic tyres designed primarily (but not only) :
for agricultural and forestry vehicles (power-driven vehicles in category T)
for agricultural machines (power-driven and trailed) and
for agricultural trailers.

Identified by speed category symbols corresponding to speeds of 65 km/h
(speed symbol 'D') and below.

Speed Category Symbols	A2	A4	A6	A8	B	D
Ref Speed (Km/h)	10	20	30	40	50	65

It does not apply to tyre types designed primarily for other purposes, such as:
Construction application (tyres marked "Industrial" or "IND" or "R4" or "F3").
Earth-moving equipment.
Industrial and lift trucks.

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Vehicles category :

- T1: 40 km/h max, track width above 1150 mm, unladen mass above 600 kg, ground clearance up to 1000 mm.
- T2: 40 km/h max, track width below 1150 mm, unladen mass above 600 kg, ground clearance below 600 mm.
- T3: 40 km/h max, unladen mass below 600 kg.
- T4: special purpose 40 km/h max.
- T5: maximum design speed of more than 40 km/h.

Category T : Wheeled tractors (T1 to T5)



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Vehicles category :

Category R : Trailers (R1 to R4)

- R1: sum of permissible masses per axle below 1 500 kg.
- R2: sum of permissible masses per axle between 1 500 kg and 3 500 kg.
- R3: sum of permissible masses per axle between 3 500 kg and 21 000 kg.
- R4: sum of permissible masses per axle above 21 000 kg.
- Index : 'a' for max design up to 40 km/h incl and 'b' for max design speed above 40 km/h.



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Vehicles category :

Category S : Interchangeable towed machinery (S1 or S2)

- S1: for agricultural or forestry use, permissible masses per axle below 3 500 kg.
- S2: for agricultural or forestry use, permissible masses per axle above 3 500 kg.
- Index : 'a' for max design up to 40 km/h incl and 'b' for max design speed above 40 km/h.



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Definitions – category of use :

"Tractor - steering wheel tyre" : tyre designed to be fitted to non-driven axles of agricultural and forestry tractors (motor vehicles in category T) ; The tread pattern of the tyre generally consists of circumferential grooves and ribs.



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Definitions – category of use :

"Tractor - drive wheel tyre - standard tread" : tyre designed to be fitted to driven axles of agricultural and forestry tractors (vehicles in categories T) suitable for sustained high torque service. The tread pattern of the tyre consists of lugs or cleats.



Sustained high torque means
e.g. ploughing or sub-soiling



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Definitions – category of use :

" Tractor - drive wheel tyre - special tread" : tyre with a tread pattern and structure primarily designed to ensure in marshy areas a better grip than that of a standard tread tyre. The tread pattern of the tyre generally consists of lugs or cleats deeper than those of a standard tyre.



For special usage. I.e.: Cane and rice

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Definitions – category of use :

"Implement tyre" : tyre designed primarily for agricultural machines or implements (vehicles in category S) or for agricultural trailers (vehicles in category R) ; however it may also equip either front steering wheels and drive wheels of agricultural and forestry tractors (vehicles in category T), but it is not suitable for sustained high torque services.



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Definitions – category of use :

"Implement - Traction tyre" :

Tyre designed primarily for the equipment of driven axles of implements or agricultural machinery, excluding sustained high torque services. The tread pattern of the tyre generally consists of lugs or cleats.



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Definitions – category of use :

"Implement - Trailer tyre" :

Tyre designed for the equipment of non driven (trailed) axles of implements, agricultural machinery or trailers.



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Definitions – category of use :

"Implement - Mixed applications tyre" :

tyre designed to be fitted to either driven and non driven axles of implements, agricultural machinery or trailers.



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Definitions :

"Table: Variation of load capacity with speed" :

Similarly to the Regulation No. 54 (annex 8), the tables in the annex 7 are showing the authorized load bonuses when operating at lower speeds.

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Marking - all tyres :

The tyre must bear :

- Manufacturer's trade name or mark
- Tyre size designation composed of
 - Nominal section width
 - Nominal aspect ratio
 - Indication of structure ("-" or "D" for diagonal, "R" for radial and "B" for bias belted)
 - The nominal rim diameter

Example :

A close-up photograph of a tyre sidewall showing the marking '480/70R30'. The characters are embossed in a raised, sans-serif font. The '480' represents the nominal section width, '70' represents the nominal aspect ratio, 'R' indicates a radial structure, and '30' represents the nominal rim diameter in inches.

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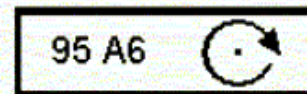
Marking – all tyres (con't) :

- The service description - association of the load capacity index with the speed category symbol to identify the reference load capacity and the reference speed.

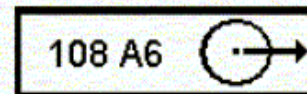
Example : **95 A6**

- For implement tyres, the service description is supplemented with the relevant application symbol(s).

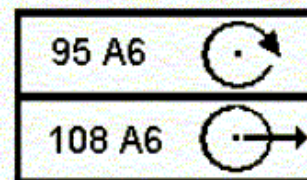
Traction tyre
Tyre for drive wheel application



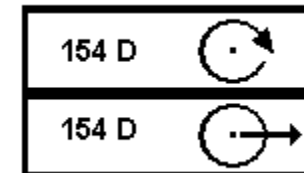
Trailer tyre
Tyre for non driven wheels



Mixed application tyre
For both driven & non driven wheels



OR



Avoid missapplication

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Avoid missapplication

Marking – all tyres (con't) :

- The supplementary service description if applicable.
This is a service description to identify a special type of service (load rating and speed category) to which the tyre type is allowed in addition to the applicable load variation with speed table (annex 7). Only applies to tractor drive wheels.

Example :



- Additional markings
 - Prefix "IF" or "VF" to the size designation, in case of Improved Flexion or Very high Flexion tyres
 - "DEEP" or "R-2" in case of special tread tyres for tractor drive wheels
 - "F-1" or "F-2" in case of tractor steering wheel tyres, in case the "FRONT" suffix to the size designation is not used
 - "LS-1", "LS-2", "LS-3" or "LS-4" in case of forestry tyres
 - "IMPLEMENT" in case of implement tyres, in case the "IMP" suffix to the size designation is not used
 - "TUBELESS" if the tyre is designed for use without an inner tube

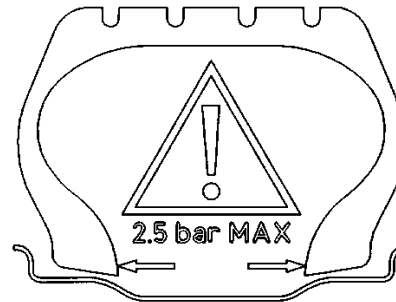
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Marking – all tyres (con't) :

- Safety pictogram - to notify the cold inflation pressure that shall not be exceeded for bead seating during tyre mounting. Pressure can be either in bar or kPa.

Example :



Address safety

- Date of manufacture – four digits : the first two showing the week, the last two showing the year of manufacture.
- The ECE tyre type approval max.



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Ensure interchangeability

Requirements – all tyres :

- Actual dimensions are measured as prescribed in Annex 6
- Section width of a tyre :
Calculated by a formula given in paragraph § 6.1
Tolerances given in paragraph § 6.3.
- Outer diameter of a tyre :
Calculated by a formula given in paragraph § 6.2.
Tolerances given in paragraph § 6.4.

Notes :

- Dimensional data and relevant tolerances for tyre sizes which do not comply to above calculations are shown in Annex 5.

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Address Safety

Requirements – all tyres (con't) :

- Resistance to burst :

Scope : applies to all tyre types

Maintain 2.5X rated pressure (min 6bar, max 10bar) in the tyre for at least 10 minutes. tyre to be defect free after test.

Note :

- The test procedure to assess the resistance to burst is described in Annex 8

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Address Safety

Requirements – for speed category D tyres only (con't) :

- Load / speed test :
Scope : applicable to tyres of speed category D only

Two alternative tests :

- On drum : speed 20 km/h

test step	% of test load	Duration (hours)
1	66	7
2	84	16
3	101	24

Load coefficients apply to 1.7m drum, higher values apply for larger drum diameters

- On trailer :

Tyre to be run at 15 km/h during 48 hours

Load = rated load + 34%

Note :

- The test procedures to assess the suitability of the tyre for the claimed performances are described in Annex 9.

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The Load / Speed test applies to tyres of speed category D only.

Main safety item addressed by the resistance to burst

Rationale :

Tyres up to the speed category B (50 km/h)

- are using proven technologies that have not shown any problem for decades
- are used on standard tractors which are mainly used **in the fields** and when used on the road, cannot go on motorways
- **are declining to the benefit of D speed category tyres**

Tyres of D speed category (65 km/h)

- are using new technologies
- are used on new generation of tractors for transportation work and in some countries, **run on motorways**
- **will become the new standard fitment in the future**

Speed Category Symbols	Ref Speed (Km/h)
A2	10
A4	20
A6	30
A8	40
B	50
D	65

Old

Future

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Annexes :

- Annex 1 : Communication
- Annex 2 : Arrangement of the approval mark
- Annex 3 : Arrangement of tyre markings
- Annex 4 : List of load capacity indices
- Annex 5 : List of tyres not complying with calculation rules of Regulation
- Annex 6 : Test method for measuring the tyre dimensions
- Annex 7 : Variation of load capacity with speed
- Annex 8 : Test procedure to assess tyre resistance to burst
- Annex 9 : Load / speed test procedure
- Annex 10 : Tyre classification code
- Annex 11 : Example of the pictogram to be marked on tyre to explicit the maximum inflation pressure not to be exceeded for bead seating during mounting



Amendments

Pending items (backup – for memo)

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- Introduction of new category of use : tyres for forestry machines
Ref document : ECE/TRANS/WP.29/GRRF/2007/20/rev1 & GRRF-65-17



Harvester



**Tyre marking example :
600/55-26.5 LS-2 154A8**

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- Removal of tyre sizes wrongly placed in the tables of annex 5 of the Regulation :

Document ECE/TRANS/WP29/GRRF/2007/20/rev.1 & GRRF-65-17

Tyre size designations 260/70R16, 260/70R18 and 260/70R20 in table 4.

Reasons: existing tyre sizes conform to all general requirements of paragraphs 6.1.1-6.2.1-6.3.2 and 6.4.2. They do not conform to dimensional values shown in the table

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- **Harmonisation of reg 106 requirements for type approval documents** (Ref document ECE/TRANS/WP.29/GRRF/2009/16).

Text in other regulation :

Reg. No. 54 paragraph 5.3:

"Notice of approval or of refusal of approval of a type of pneumatic tyre pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1 to this Regulation."

Reg. No. 75 paragraph 5.3:

"Notice of approval or of refusal or of extension or withdrawal of approval of a type of pneumatic tyre pursuant to this Regulation shall be communicated to the Parties to the Agreement applying this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation."

Reg. No. 75 paragraph 5.4.2:

The number of this Regulation, followed by the letter "R", a dash and the type approval number.

Reg. No. 30 paragraph 5.3:

"Notice of approval or of extension or refusal or withdrawal of approval or production definitively discontinued of a type of pneumatic tyre pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation."

Proposed amendment :

Reg No. 106 Paragraph 5.3., amend to read, as in the same paragraph of regulation No.30:

*Notice of approval or **extension or refusal or withdrawal of approval or production definitively discontinued** of a type of pneumatic tyre pursuant to this Regulation shall be communicated to the Parties to the **1958** Agreement **applying** this Regulation, by means of a form conforming to the model in Annex 1 to this Regulation ~~and of a photograph or of drawings supplied by the applicant for approval, in a format not exceeding A4 (210 x 297 mm) or folded to that format and on an appropriate scale.~~*

Paragraph 5.4.2., amend to read, as in the same paragraph of regulation N.75:

The number of this Regulation, followed by the letter "R", a dash and the type approval number.

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- Removal of tyre sizes wrongly placed in the tables of annex 5 of the Regulation : Document ECE/TRANS/WP.29/GRRF/2007/21/Rev.1
Tyre size designations AT21x7-10, AT22x9-8, AT23x7-10, AT23x8-11, AT24x8-11, AT24x9-11, AT24x10-11, AT25x8-12, AT25x11-9 and AT25x11-10 in Table 7 (1 of 2)

Reasons: existing tyre sizes are classified with a speed symbol F (80 km/h) [outside of the scope of regulation 106], are allowed up to 130 km/h, and in Europe are mainly fitted to street legal as well as to off-the road vehicles (see images of typical vehicles)



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Backup slides

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The Load / Speed test applies to tyres of speed category D only.

History :

When the Regulation 106 was established,

- The tractors were mainly used in the field

- The main safety risk was present during the mounting

- The speed category A8 tyres were the reference and were covered by

 - A pictogram indicating the maximum pressure allowed during mounting

 - A resistance to burst test ensuring a safety margin

For the last few years, new tractors requiring speed category D tyres appeared

- They are more used on the road

- They can run on motorways

The technology followed by the introduction of the speed category D tyres which are becoming the standard fitment to the detriment of A8 tyres.

The load / speed test became justified (mainly for heat rise issues).

Backup chart

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Backup chart

Vehicle Category

Full definitions from EC Directive 2003/37

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Backup chart

Vehicles category :

Category T : Wheeled tractors

- Category T1: wheeled tractors with a maximum design speed of not more than 40 km/h, with the closest axle to the driver (1) having a minimum track width of not less than 1 150 mm, with an unladen mass, in running order, of more than 600 kg, and with a ground clearance of not more than 1 000 mm.
- Category T2: wheeled tractors with a maximum design speed of not more than 40 km/h, with a minimum track width of less than 1 150 mm, with an unladen mass, in running order, of more than 600 kg and with a ground clearance of not more than 600 mm. However, where the height of the centre of gravity of the tractor (2) (measured in relation to the ground) divided by the average minimum track for each axle exceeds 0,90, the maximum design speed is restricted to 30 km/h.
- Category T3: wheeled tractors with a maximum design speed of not more than 40 km/h, and with an unladen mass, in running order, of not more than 600 kg.
- Category T4: special purpose wheeled tractors with a maximum design speed of not more than 40 km/h (as defined in Appendix 1).
 - T4.1 High-clearance tractors
 - T4.2 Extra-wide tractors
 - T4.3 Low-clearance tractors
- Category T5: wheeled tractors with a maximum design speed of more than 40 km/h.

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Backup chart

Vehicles category :

Category R : Trailers

- Category R1: trailers, the sum of the technically permissible masses per axle of which does not exceed 1 500 kg.
- Category R2: trailers, the sum of the technically permissible masses per axle of which exceeds 1 500 kg but does not exceed 3 500 kg.
- Category R3: trailers, the sum of the technically permissible masses per axle of which exceeds 3 500 kg but does not exceed 21 000 kg.
- Category R4: trailers, the sum of the technically permissible masses per axle of which exceeds 21 000 kg.

Each trailer category also includes an 'a' or 'b' index, according to its design speed:

- 'a' for trailers with a maximum design speed below or equal to 40 km/h,
- 'b' for trailers with a maximum design speed above 40 km/h.

Example: Rb3 is a category of trailers for which the sum of the technically permissible masses per axle exceeds 3 500 kg but does not exceed 21 000 kg, and which are designed to be towed by a tractor in category T5.

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Backup chart

Vehicles category :

Category S : Interchangeable towed machinery

- Category S1: Interchangeable towed machinery intended for agricultural or forestry use, the sum of the technically permissible masses per axle of which does not exceed 3 500 kg.
- Category S2: Interchangeable towed machinery intended for agricultural or forestry use, the sum of the technically permissible masses per axle of which exceeds 3 500 kg.

Each category of interchangeable towed machinery also includes an 'a' or 'b' index, according to its design speed:

- 'a' for interchangeable towed machinery with a maximum design speed below or equal to 40 km/h,
- 'b' for interchangeable towed machinery with a maximum design speed above 40 km/h.

Example: Sb2 is a category of interchangeable towed machinery for which the sum of the technically permissible masses per axle exceeds 3 500 kg, and which is designed to be towed by a tractor in category T5.