

Working paper No. : TYREgr-02-03-REV1
(Harmonised Method of Measuring
the Physical Dimensions of Tyres)

**HARMONISED METHOD OF MEASURING THE PHYSICAL DIMENSIONS OF PNEUMATIC
TYRES**

1. Introduction

The following paragraphs describe in detail the requirements for determining the physical dimensions of pneumatic tyres for approval according to this regulation. The four characteristics to be determined are the overall width, the section width, the outside diameter and the tread wear indicator height. If all of these characteristics are within the specified tolerances, the physical dimensions of the tyre are acceptable.

2. Definitions (see paragraph XXX above for detailed definitions of these terms)

2.1. [Overall width of tyre is defined as ...]

2.1.1. There is no defined theoretical overall width of standard tyres. It is a measured characteristic, not a calculated one.

2.1.2. However, for tyres identified by the "tyre to rim fitment configuration" symbol "A" or "U", the theoretical overall width of the tyre, in the lower area of the tyre, equals the nominal width of the rim on which the tyre is mounted, as shown by the manufacturer in the descriptive note, increased by 20 mm.

2.2. The section width of the tyre is its width excluding any markings or protective ribs.

2.2.1. The theoretical section width shall be calculated by the following formula:

$$S = S_1 + K(A - A_1),$$

where:

S is the "theoretical section width" expressed in mm;

S_1 is the "nominal section width" (in mm) as shown on the side wall of the tyre in the designation of the tyre as prescribed;

A is the width (expressed in mm) of the measuring rim, as shown by the manufacturer in the descriptive note;^{1/}

A_1 is the width (expressed in mm) of the theoretical rim.

A_1 shall be taken to equal S_1 multiplied by the factor x, as specified by the manufacturer, and K shall be taken to equal 0.4.

2.2.2. However, for the types of tyres for which the designation is given in the first column of Annex XXX to this Regulation, the theoretical section width shall be that given opposite the tyre designation in these tables.

2.2.3. However, for tyres identified by the "tyre to rim fitment configuration" symbol "A" or "U", K shall be taken equal to 0.6.

2.3. Outer diameter of tyre

2.3.1. The theoretical outer diameter of the tyre shall be calculated by the following formula:

^{1/} When the conventional number is given by codes, the value in millimetres is obtained by multiplying the code number by 25.4.

$D = d + 2H$, where:

D is the theoretical outer diameter in millimetres,

d is the conventional number defined in paragraph XXXX above, in millimetres; ^{2/}

H is the nominal section height in millimetres, equal to:

$$H = 0.01 S_1 * Ra$$

S_1 is the nominal section width in millimetres, and

Ra is the nominal aspect ratio,

all as shown on the side wall of the tyre in the tyre-size designation in conformity with the requirements of paragraph XXX above.

2.3.1.1. However, for the types of tyres for which the designation is given in the first column of annex XXX to this Regulation, the theoretical outer diameter shall be that given opposite the tyre designation in these tables.

2.3.1.2. However, for tyres identified by the tyre to rim fitment configuration symbol "A" or "U", the theoretical outer diameter shall be that specified in the tyre size designation as shown on the side wall of the tyre.

2.4. Tread wear indicator height

2.4.1. The theoretical height of the tread wear indicators is fixed at 1.6 mm from the bottom of the tread grooves. See paragraph XXX above for the definition and placement of the tread wear indicators.

3. **Physical Dimensions Measurement Method**

3.1. [Mount the tyre on ...] Mount the tyre on one of the rims shown in the list of approved rims of the appropriate standards manual.

3.2. Adjust the pressure according to one of the two following tables:

	Radial and Run-flat tyres	Bias-belted tyres
Normal load	180 kPa	170 kPa
Reinforced	220 kPa	Not applicable
T-type temporary use spares	420 kPa	Not applicable

Diagonal (bias-ply) tyres			
Play rating	Speed Category		
	L, M, N	P, Q, R, S	T, U, H, V
4	170 kPa	200 kPa	Not applicable
6	210 kPa	240 kPa	260 kPa
8	250 kPa	280 kPa	300 kPa

^{2/} When the conventional number is given by codes, the value in millimetres is obtained by multiplying the code number by 25.4.

- 3.3. Condition the tyre, mounted on its rim, at the ambient room temperature between 18°C and 36°C for not less than 24 hours.
- 3.4. Readjust the pressure to that specified in paragraph 3.2 above.
- 3.5. Measure the overall width at four equally spaced points around the tyre, taking the thickness of protective ribs or bands into account. The reported value will be the average of the four measurements rounded to the nearest millimetre.
- 3.6. Measure the section width at four equally spaced points around the tyre. The thickness of any markings or protective ribs or bands is not taken into account. The reported value is the average of the four measurements rounded to the nearest millimetre.
- 3.7. Determine the outer diameter by measuring the maximum circumference, dividing the result by 3.1416 and rounding to the nearest millimetre.
- 3.8. Determine the height of the tread wear indicators by measuring the difference between the total depth of the tread groove in the vicinity of the tread wear indicator and the depth to the top of the tread wear indicator. Repeat this measurement for one tread wear indicator in each row (minimum of 6 or 4, depending on the seat diameter) and record all of the individual values rounded to the nearest tenth of a millimetre.

4. **Physical Dimension Tolerances**

- 4.1. Overall width
 - 4.1.1. The tyre overall width may exceed the maximum section width defined in paragraph 4.2. below by [...]
- 4.2. Section width
 - 4.2.1. The tyre maximum section width may exceed the theoretical section width defined in paragraph 2.2. above by the following percentages:
 - 4.2.1.1. in diagonal (bias-ply) tyres: 6%
 - 4.2.1.2. in radial-ply and run-flat tyres: 4%
- 4.3. Outer diameter
 - 4.3.1. The outer diameter of a tyre must not be outside the values Dmin and Dmax obtained from the following formulae:
$$D_{min} = d + (2H \cdot a)$$
$$D_{max} = d + (2H \cdot b)$$
where:
 - 4.3.1.1. for sizes listed in Annex XXX, and for tyres identified by the "tyre to rim fitment configuration" symbol "A" or "U", the nominal section height H is equal to:
$$H = 0.5 (D-d), \text{ (for references see paragraph 2.3.)}$$
 - 4.3.1.2. for other sizes, not listed in Annex XXX, "H" and "d" are as defined in paragraph 2.3.1.

4.3.1.3. the coefficients "a" and "b" are:

4.3.1.3.1. coefficient "a" = 0.97

4.3.1.3.2. coefficient "b" = 1.04 for normal (road type) radial and run-flat tyres and 1.08 for normal (road type) diagonal and bias-belted tyres

4.3.1.4. for snow tyres the maximum overall diameter (Dmax) may be exceeded by 1%.

4.4. Tread wear indicators

4.4.1. The height of each of the measured tread wear indicators shall be 1.6 mm with a tolerance of +0.6 mm/-0.0 mm.