

## HARMONISED METHOD OF MEASURING THE PHYSICAL DIMENSIONS OF RADIAL PNEUMATIC TYRES

### 1. Introduction

The following paragraphs describe in detail the requirements for determining the physical dimensions of radial pneumatic tyres for approval according to this regulation. The three characteristics to be determined are the overall 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. The overall width of the tyre is defined as its width at the widest point, including any markings or protective ribs, but excluding rim protectors.

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. A rim protector is defined as a protruding circumferential rubber rib in the lower sidewall which is intended to protect the wheel rim flange and other protruding rim areas from damage.

2.3. The section width of the tyre is its width at the widest point excluding any markings, protective ribs or rim protectors.

2.3.1. 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; <sup>1/</sup>

$A_1$  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.

2.3.2. 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.

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

<sup>1/</sup> When the conventional number is given by codes, the value in millimetres is obtained by multiplying the code number by 25.4.

2.4. Outer diameter of tyre

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

$$D = d + 2H, \text{ where:}$$

D is the theoretical outer diameter in millimetres,

d is the conventional number defined in paragraph XXXX above, in millimetres; <sup>2/</sup>

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

$$H = 0.01 S_1 * Ra$$

S<sub>1</sub> 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.

2.4.1.1. 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.

2.4.1.2. 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.

2.5. Tread wear indicator height

2.5.1. 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 one of the approved rims mentioned in the appropriate Standards Manual.

3.2. Adjust the pressure according to the following table:

	<b>Radial and Run-flat tyres</b>
Standard load	180 kPa
Reinforced or Extra Load	220 kPa

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.

<sup>2/</sup> When the conventional number is given by codes, the value in millimetres is obtained by multiplying the code number by 25.4.

- 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. Determine the outer diameter by measuring the maximum circumference, dividing the result by 3.1416 and rounding to the nearest millimetre.
- 3.7. 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 theoretical section width defined in paragraph 2.3.1 above by the following percentages:

4.1.1.1. in radial and run flat tyres: 4%

4.1.1.2. In addition, for tyres with protective ribs, the overall width may exceed the values shown above by an additional 8 mm.

4.2. Outer diameter

- 4.2.1. The outer diameter of a tyre must not be outside the values  $D_{min}$  and  $D_{max}$  obtained from the following formulae:

$$D_{min} = d + (2H \cdot a)$$

$$D_{max} = d + (2H \cdot b)$$

where:

- 4.2.1.1. 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:

$$H = 0.5 (D-d), \text{ (for references see paragraph 2.4.)}$$

4.2.1.2. for other sizes, not listed in Annex XXX, " $H$ " and " $d$ " are as defined in paragraph 2.4.1.

4.2.1.3. the coefficients " $a$ " and " $b$ " are:

4.2.1.3.1. coefficient " $a$ " = 0.97

4.2.1.3.2. coefficient " $b$ " = 1.04 for normal (road type) radial and run-flat tyres

4.2.1.4. for snow tyres the maximum overall diameter ( $D_{max}$ ) may be exceeded by 1%.

4.3. Tread wear indicators

- 4.3.1. 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.

