

Council directive 92/23/EEC of 31 March 1992 relating to tyres for motor vehicles and their trailers and to their fitting (repealed)

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## [<sup>F1</sup>ANNEX I

### ADMINISTRATIVE PROVISIONS FOR THE EC TYPE-APPROVAL OF TYRES

#### Textual Amendments

**F1** Substituted by [Directive 2001/43/EC of the European Parliament and of the Council of 27 June 2001 amending Council Directive 92/23/EEC relating to tyres for motor vehicles and their trailers and to their fitting.](#)

1. APPLICATION FOR THE EC TYPE-APPROVAL OF A TYPE OF TYRE
  - 1.1. The application for EC type-approval for a type of tyre pursuant to Article 3(4) of Directive 70/156/EEC is to be submitted by the tyre manufacturer.
    - 1.1.1. The application for EC type-approval pursuant to Annex II is to be accompanied, in triplicate, by a description of the tyre type as described in the information document in Appendix 1.
      - 1.1.1.1. The application must be accompanied (all in triplicate) by a sketch, or a representative photograph, which identifies the tyre tread pattern and a sketch of the envelope of the inflated tyre mounted on the measuring rim showing the relevant dimensions (see sections 6.1.1. and 6.1.2. of Annex II) of the type submitted for approval.
      - 1.1.1.2. It must be accompanied either by the test report issued by the appointed technical service or by a number of samples to be determined by the approval authority.
    - 1.1.2. The application for EC type-approval pursuant to Annex V is to be accompanied, in triplicate, by a description of the tyre type as described in the information document in Appendix 3.
      - 1.1.2.1. The application must be accompanied (all in triplicate) by sketches, drawings or photographs of the tread pattern(s) that is/are representative of the type of tyres.
      - 1.1.2.2. It must also be accompanied either by the test report issued by the appointed technical service or by a number of samples to be determined by the approval authority.
  - 1.2. The manufacturer may apply for EC type-approval to be extended
    - 1.2.1. to include modified tyre types for EC type-approvals pursuant to Annex II and/or
    - 1.2.2. to include additional tyre size designations and/or amended brand names or manufacturer's trade descriptions and/or tread patterns for EC type-approvals pursuant to Annex V.
  - [<sup>F2</sup>1.3. The approval authority may accept the laboratories of the tyre manufacturers as approved test laboratories pursuant to Article 14(1) of Directive 70/156/EEC.]

#### Textual Amendments

**F2** Substituted by [Commission Directive 2005/11/EC of 16 February 2005 amending, for the purposes of its adaptation to technical progress, Council Directive 92/23/EEC relating to tyres for motor vehicles and their trailers and to their fitting \(Text with EEA relevance\).](#)

2. INSCRIPTIONS

- 2.1. Samples of a type of tyre submitted for EC type-approval must bear the applicant's clearly visible and indelible trade mark or name and must allow sufficient space for the inscription of the EC type-approval mark as required in section 4 of this Annex.
3. EC TYPE-APPROVAL
  - 3.1. EC type-approval pursuant to Article 4 of Directive 70/156/EEC is to be granted and an EC type-approval number is to be issued in respect of any tyre type, submitted in accordance with 1.1.1. above, which satisfies the requirements of Annex II.
    - 3.1.1. Notice of approval or extension or refusal or withdrawal of approval or of production definitively discontinued in relation to a tyre type pursuant to Annex II must be communicated to the Member States in accordance with Article 4(6) of Directive 70/156/EEC.
    - 3.1.2. EC type-approval pursuant to Article 4 of Directive 70/156/EEC is to be granted and an EC type-approval number is to be issued in respect of any tyre type, submitted in accordance with 1.1.2. above, which satisfies the requirements of Annex V.
    - 3.2.1. Notice of approval or extension or refusal or withdrawal of approval or of production definitely discontinued in relation to a tyre type pursuant to Annex V must be communicated to the Member States in accordance with Article 4(6) of Directive 70/156/EEC.
  - 3.3. An EC type-approval number is to be assigned to each tyre type-approved. The same Member State must not assign the same number to another tyre type. In particular, approval numbers assigned pursuant to Annex II and EC type-approval numbers assigned pursuant to Annex V must be different.
4. EC TYPE-APPROVAL MARKING
  - 4.1. Any tyre conforming to a type in respect of which EC type-approval has been granted pursuant to this Directive must bear the relevant EC type-approval mark.
  - 4.2. The EC type-approval mark will consist of a rectangle surrounding the lower case letter 'e' followed by the distinguishing number of the Member State which has granted the type-approval as per Annex VII to Directive 70/156/EEC. The EC type-approval number will consist of the EC type-approval number shown on the certificate completed for the type, preceded by two figures: '00' for commercial vehicle tyres, '02' for passenger car tyres.
    - 4.2.1. The rectangle forming the EC type-approval mark must have a minimum length of 12 mm and a minimum height of 8 mm. Letter(s) and number(s) must be at least 4 mm in height.
  - 4.3. The EC type-approval marks and numbers, and any additional marks required in Annex II, section 3., the latter for the type-approval pursuant to the requirements of Annex II, must be affixed as prescribed in that section.
  - 4.4. Approval numbers assigned pursuant to Annex V must be followed by the suffix 's' where 's' is an abbreviation for sound.
  - 4.5. An example of the EC type-approval mark is given below:

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e 24

00479

e 3

00687-s

The tyre bearing the EC type-approval mark shown above is a commercial vehicle tyre (00) satisfying the EC requirements (e), for which the EC type-approval mark has been granted in Ireland (24) under the number 479 pursuant to Annex II and in Italy (3) under the number 687-s pursuant to Annex V.

Note:

The numbers '479' and '687' (EC-mark type-approval numbers) and the number '24' and the digit '3' (letters and number of the Member States which granted the EC approval) are for guidance only.

The approval numbers must be placed close to the rectangle and may be above, below, to the left or to the right. The characters of the approval number must all be on the same side of the 'e' and face in the same direction.

## 5. MODIFICATION OF A TYRE TYPE

- 5.1. If a tyre type-approved pursuant to Annex II or pursuant to Annex V has been modified, the provisions of Article 5 of Directive 70/156/EEC shall apply.
- 5.2. If the tread pattern of a tyre has been modified in the case of type-approvals pursuant to Annex II, no repetition of the tests prescribed in Annex II is considered necessary.
- 5.3. In the case where tyre-size designations or trade marks are added to a range of tyres type-approved pursuant to Annex V, any requirement for retesting shall be determined by the type approval authority.
- 5.4. In the case of modification of the tyre tread pattern of a range of tyres approved pursuant to Annex V, a representative set of samples shall be retested unless the type approval authority is satisfied that the modification does not affect the tyre/road noise emissions.

## 6. CONFORMITY OF PRODUCTION

- 6.1. The general rules to ensure the conformity of production shall be adopted in accordance with the provisions laid down in Article 10 of Directive 70/156/EEC.
- 6.2. In particular, when checks are carried out in accordance with Appendix 1 to Annex V in order to check the conformity of production, if the noise level of the tyre tested does not exceed the limit values set out in section 4.2. of Annex V by more than 1 dB(A), the production shall be deemed to conform to the requirements of section 4 of the abovementioned Annex V.]

[<sup>F1</sup>Appendix 1

INFORMATION DOCUMENT No ... RELATING TO EC TYPE-APPROVAL FOR A TYPE OF TYRE

(Annex II to Directive 92/23/EEC)]

The following information, if applicable, must be supplied in triplicate and include a list of contents. Drawings, if any, must be supplied in appropriate scale and in sufficient detail on size A4 or folded to that size. In the case of microprocessor controlled functions supply relevant performance-related information.

- 0. GENERAL
  - 0.1. Make (trade name of manufacturer): .....
  - 0.2. Commercial description(s): .....
  - 0.3. Means of identification (tyre-size designation): .....
  - 0.5. Name and address of applicant: .....
  - 0.7. Address(es) of manufacturing plant(s): .....
  
- 6. TYRES
  - 6.1. The category of use: .....
  - 6.2. The structure: .....
  - 6.3. The speed category: .....
  - 6.4. The load-capacity index (indices):
    - single formation: .....
    - dual (twin) formation: .....
  - 6.5. Whether the tyre is to be fitted with or without an inner tube: .....
  - 6.7. Whether the tyre is: .....
  - 6.7.1. Passenger car 'standard' or 'reinforced' or 'T-type temporary use spare' tyre: .....
  - 6.7.2. Commercial vehicle 'regroovable' tyre: .....
  - 6.8. The ply-rating number (if applicable) of diagonal (bias-ply) tyres: .....
  - 6.9. The overall dimensions: overall section width and outer diameter: .....
  - 6.10. The rim(s) on which the tyre can be mounted: .....
  - 6.11. The measuring rim and test rim: .....
  - 6.12. The measuring pressure (bar): .....
  - 6.13. The additional load/speed combinations in cases where section 6.2.5 of Annex II is applied: .....
  - 6.14. The test pressure where the manufacturer requests the application of section 1.3 of Appendix 7, Part A of Annex II or the 'PSI' pressure index: .....
  - 6.15. The factor x referred to in section 2.20 of Annex II or the applicable table of Appendix 5 to Annex II: .....

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[<sup>F1</sup>Appendix 2

EC TYPE-APPROVAL CERTIFICATE

(tyres)

MODEL

(maximum format: A4 (210 mm × 297 mm))]

STAMP OF ADMINISTRATION

Communication concerning the:

- type-approval (1)
- extension of type-approval (1)
- refusal of type-approval (1)
- (2) - withdrawal of type-approval (1)
- discontinuation of production (1) <

of a component with regard to Directive 92/23/EEC relating to tyres.

(1) EC type-approval < No: ..... Extension No: .....

SECTION I

0. General

- 0.1. Make (trade name of manufacturer): .....
0.2. Commercial description(s): .....
0.3. Means of identification marked on the component (tyre) (a): .....
0.4. List of applicable annexes: .....
0.5. Name and address of applicant: .....
0.6. Address(es) of manufacturing plant(s): .....

(1) Delete where inapplicable.

(a) The means of identification of type, if used, must appear only on those tyres covered by the individual approval.

If the means of identification of type contains characters not relevant to describe the tyre types covered by this component type-approval certificate (e.g. a date code) such characters must be represented in the documentation by the symbol:

'?' (e.g. ABC ?? 123 ??)

- the size designation,
- the category of use,

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**SECTION II**

1. **Additional information**
- 1.1. The list of rims on which the tyres may be fitted: .....
2. Technical service responsible for carrying out the tests: .....
3. Date of test report: .....
4. Number of test report: .....
5. Grounds for extending component type-approval (where appropriate): .....  
.....
6. Comments (if any): .....
7. Place: .....
8. Date: .....
9. Signature: .....
10. A list of documents making up the type-approval file lodged with the authority that has granted the component approval and which may be obtained on request, is attached.

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### [<sup>F3</sup> Appendix 3

#### **INFORMATION DOCUMENT No ... RELATING TO EC TYPE-APPROVAL FOR A TYPE OF TYRE RELATING TO TYRE/ROAD NOISE EMISSION**

(Annex V to Directive 92/23/EEC)

The following information, if applicable, must be supplied in triplicate and include a list of contents. Drawings, if any, must be supplied to an appropriate scale and in sufficient detail on size A4 or folded to that size. Relevant performance-related information must be supplied in the case of microprocessor controlled functions.

#### 1. GENERAL

1.1. Manufacturer's name:

1.2. Name and address of applicant:

1.3. Address(es) of manufacturing plant(s):

1.4. Brand name(s), Trade description(s) or Trade mark(s) to be used for particular tyre type-approval requested.

#### 2. TYRES

2.1. Tyre classification: (class C1, class C2 or class C3)

2.2. Category of use: (normal, snow or special)

2.3. Details of the major features, with respect to the effects on tyre/road noise emission, of the tread pattern(s) to be used on the designated range of tyre sizes. This may be by drawing, photograph or description but must be sufficient to allow the type approval authority or technical service to determine whether any subsequent changes to the major features will adversely affect the tyre/road noise emission.

*Note: The effect of changes in minor details of tyre tread and construction on the tyre/road noise emission will be determined during checks on the conformity of production.*

2.4 Tyre structure

2.5. List of tread-pattern designations:

(specify for each trade mark or brand name and trade description the list of tyre designations as per section 2.17. of Annex II to Directive 92/23/EEC adding, in the case of class C1 tyres, the mark 'Reinforced' or 'Extra Load', if applicable).



## Appendix 4]

**EC TYPE-APPROVAL CERTIFICATE****(tyre/road noise emission)**

MODEL

(maximum format: A4 (210 mm × 297 mm))

|                         |
|-------------------------|
| Stamp of administration |
|-------------------------|

Communication concerning the:

- EC type-approval <sup>(1)</sup>
- extension of EC type-approval <sup>(1)</sup>
- refusal of EC type-approval <sup>(1)</sup>
- withdrawal of EC type-approval <sup>(1)</sup>
- discontinuation of production <sup>(1)</sup>

of a type of tyre with regard to Annex V to Directive 92/23/EEC, as last amended by Directive . . ./ . . ./EC, relating to tyre/road noise emission.

EC type-approval No: . . . . . Extension No: . . . . .

## SECTION I

0. **General**

- 0.1. Manufacturer's name:
- 0.2. Name and address of applicant:
- 0.3. Address(es) of manufacturing plant(s):

## SECTION II

1. **Additional information**

- 1.1. Brand name(s) and trade description(s):
- 1.2. Tyre classification: (class C1, class C2 or class C3) <sup>(1)</sup>
- 1.3. Category of use: (Normal/Snow/Special) <sup>(1)</sup>
- 2. Technical Service responsible for carrying out tests:
- 3. Date of test report:
- 4. Number of test report:
- 5. Grounds for extending EC type-approval (where appropriate):
- 6. Comments (if any):
- 7. Date and place:
- 8. Signature:
- 9. A list of documents making up the EC type-approval file lodged with the authority that has granted the approval and which may be obtained on request is attached.

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<sup>(1)</sup> Delete as appropriate.

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## ANNEX II

### REQUIREMENTS FOR TYRES

#### 1. DEFINITIONS

- .....
2. For the purposes of this Directive:
- 2.1. 'type of tyre' means a category of tyres which do not differ in such essential respects as:
- 2.1.1. manufacturer's name or trade mark;
- 2.1.2. tyre-size designation;
- 2.1.3. category of use:
- normal : normal road-use tyre,
  - special : special-use tyre, e.g. tyre for mixed use (both on and off the road) and at restricted speed,
  - snow tyre,
  - temporary-use spare tyre;
- 2.1.4. structure (diagonal (bias-ply), bias-belted, radial-ply);
- 2.1.5. speed category;
- 2.1.6. load capacity index;
- 2.1.7. tyre cross-section;
- 2.2. 'snow tyre' means a tyre the tread pattern and structure of which are primarily designed to ensure in mud and fresh or melting snow a performance better than that of a normal tyre. The tread pattern of a snow tyre generally consists of groove (rib) and/or solid-block elements more widely spaced than on a normal tyre;
- 2.3. 'structure' of a tyre means the technical characteristics of the tyre's carcass. The following structures are distinguished in particular:
- 2.3.1. 'diagonal' or 'bias-ply' describes a tyre structure in which the ply cords extend to the bead and are laid at alternate angles of substantially less than 90° to the centreline of the tread;
- 2.3.2. 'bias-belted' describes a tyre structure of diagonal (bias-ply) type in which the carcass is restricted by a belt comprising two or more layers of substantially inextensible cord material laid at alternate angles close to those of the carcass;
- 2.3.3. 'radial' describes a tyre structure in which the ply cords extend to the beads and are laid substantially at 90° to the centreline of the tread, the carcass being stabilized by an essentially inextensible circumferential belt;
- 2.3.4. 'reinforce' describes a tyre structure in which the carcass is more resistant than that of the corresponding standard tyre;
- 2.3.5. 'temporary-use spare tyre' means a tyre different from a tyre intended to be fitted to any vehicle for normal driving conditions; but intended only for temporary use under restricted driving conditions;

- 2.3.6. *'T-type temporary-use spare tyre'* means a type of temporary-use spare tyre designed for use at inflation pressure higher than those established for standard and reinforced tyres;
- 2.4. *'bead'* means the part of a tyre which is of such shape and structure as to fit the rim and hold the tyre on it<sup>(1)</sup>;
- 2.5. *'cord'* means the strands forming the fabric of the plies in the tyre<sup>(1)</sup>;
- 2.6. *'ply'* means a layer of rubber-coated parallel cords<sup>(1)</sup>;
- 2.7. *'carcass'* means that part of a tyre other than the tread and the rubber sidewalls which, when inflated, bears the load<sup>(1)</sup>;
- 2.8. *'tread'* means that part of a tyre which comes into contact with the ground<sup>(2)</sup>;
- 2.9. *'sidewall'* means the part of the tyre, excluding the tread, which is visible when the tyre, fitted to a rim, is viewed from the side<sup>(2)</sup>;
- 2.10. *'lower sidewall'* means the area below the line of maximum section width of the tyre, which is visible when the tyre, fitted to a rim, is viewed from the side<sup>(2)</sup>;
- 2.11. *'tread groove'* means the space between the adjacent ribs or blocks in the tread pattern<sup>(2)</sup>;
- 2.12. *'section width'* means the linear distance between the outsides of the sidewalls of an inflated tyre, excluding elevations due to labelling (marking), decoration or protective bands or ribs<sup>(2)</sup>;
- 2.13. *'overall width'* means the linear distance between the outsides of the sidewalls of an inflated tyre, including labelling (marking), decoration and protective bands or ribs<sup>(2)</sup>;
- 2.14. *'section height'* means a distance equal to half the difference between the outer diameter of the tyre and the nominal rim diameter<sup>(2)</sup>;
- 2.15. *'nominal aspect ratio Ra'* means one hundred times the number obtained by dividing the number expressing the nominal section height in millimetres by the number expressing the nominal section width in millimeters;
- 2.16. *'outer diameter'* means the overall diameter of an inflated new tyre<sup>(2)</sup>;
- 2.17. *'tyre-size designation'*:
- 2.17.1. means a designation showing:
- 2.17.1.1. the nominal section width. This width must be expressed in mm, except in the case of tyres for which the size designation is shown in the first column of the tables in Appendix 5;
- 2.17.1.2. the nominal aspect ratio, except in the case of tyres for which the size designation is shown in the first column of the tables in Appendix 5;
- 2.17.1.3. a conventional number 'd' (the 'd' symbol) denoting the nominal rim diameter and corresponding to the diameter of the rim expressed either in inches (number below 100 — see table) or in mm (numbers above 100) but not both.

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The exhaustive range of values is shown in the table below:

| <b>‘d’Nominal rim diameter (the symbol)</b> |   |
|---|---|
| <b>Expressed in inches(code)</b>            | <b>Equivalence in mm(reference section 6.1.2.1)</b> |
| 10  | 254   |
| 11  | 279   |
| 12  | 305   |
| 13  | 330   |
| 14  | 356   |
| 15  | 381   |
| 16  | 406   |
| 17  | 432   |
| 18  | 457   |
| 19  | 483   |
| 20  | 508   |
| 21  | 533   |
| 22  | 559   |
| 24  | 610   |
| 25  | 635   |
| 14,5  | 368   |
| 16,5  | 419   |
| 17,5  | 445   |
| 19,5  | 495   |
| 20,5  | 521   |
| 22,5  | 572   |
| 24,5  | 622   |

2.17.1.4. the letter ‘T’ in front of the nominal section width in case of T-type temporary-use spare tyres;

2.18. ‘nominal rim diameter (*d*)’ means the diameter of the rim on which a tyre is designed to be mounted<sup>(3)</sup>;

2.19. ‘rim’ means the support for a tyre-and-tube assembly, or for a tubeless tyre, on which the tyre beads are seated<sup>(3)</sup>;

2.20. ‘theoretical rim’ means the notional rim whose width would be equal to *x* times the nominal section width of a tyre; the value ‘*x*’ must be specified by the tyre manufacturer;

- 2.21. *'measuring rim'* means the rim on which a tyre must be fitted for size measurements;
- 2.22. *'test rim'* means the rim on which a tyre must be fitted for testing;
- 2.23. *'chunking'* means the breaking away of pieces of rubber from the tread;
- 2.24. *'cord separation'* means the parting of the cords from their rubber coating;
- 2.25. *'ply separation'* means the parting of adjacent plies;
- 2.26. *'tread separation'* means the pulling away of the tread from the carcass;
- 2.27. *'tread-wear indicators'* mean projections within the tread-grooves designed to give a visual indication of the degree of wear of the tread;
- 2.28. *'load-capacity index'* means one or two numbers which indicate the load the tyre can carry in single or in single and dual formation at the speed corresponding to the associated speed category and when operated in conformity with the requirements governing utilization specified by the manufacturer. The list of these indices and their corresponding masses is given in Annex II, Appendix 2;
- 2.28.1. on passenger car tyres there must be one load index only;
- 2.28.2. on commercial vehicle tyres there may be one or two load indices, the first one for single formation and the second one, when present, for dual (twin) formation in which case the two indices are divided by a slash (/);
- 2.28.3. a type of tyre may have either one or two sets of load capacity indices depending on whether or not the provisions of section 6.2.5 are applied;
- 2.29. *'speed category'*, expressed by the speed category symbol as shown in the table in 2.29.3;
- 2.29.1. in the case of a passenger car tyre, the maximum speed which the tyre can sustain;
- 2.29.2. in the case of a commercial vehicle tyre, the speed at which the tyre can carry the mass corresponding to the load capacity index;
- 2.29.3. The speed categories are as shown in the table below:

| <b>Speed category symbol</b> | <b>Corresponding speed(km/h)</b> |
|------------------------------|----------------------------------|
| F                            | 80                               |
| G                            | 90                               |
| J                            | 100                              |
| K                            | 110                              |
| L                            | 120                              |
| M                            | 130                              |
| N                            | 140                              |
| P                            | 150                              |
| Q                            | 160                              |
| R                            | 170                              |

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|   |     |
|---|-----|
| S | 180 |
| T | 190 |
| U | 200 |
| H | 210 |
| V | 240 |

- 2.29.4. tyres suitable for maximum speeds higher than 240 km/h are identified by means of the letter code ‘Z’ placed within the tyre size designation;
- 2.29.5. a type of tyre may have either one or two sets of speed category symbols depending on whether or not the provisions of section 6.2.5 are applied;
- 2.30. *‘table: Variation of load capacity with speed’* means: the table, in Annex II Appendix 8, showing as a function of the load capacity indices and nominal speed category symbols the load variations which a tyre can withstand when used at speeds different from that corresponding to its speed category symbol;
- 2.30.1. the load variations do not apply in the case of passenger car tyres nor, in the case of commercial vehicle tyres, to the additional load capacity indices and speed category symbol when the provisions of section 6.2.5 are applied;
- 2.31. *‘maximum load rating’* means the maximum mass the tyre is rated to carry:
- 2.31.1. in the case of passenger car tyres suitable for speeds not exceeding 210 km/h, the maximum load rating must not exceed the value associated with the load capacity index of the tyre;
- 2.31.2. in the case of passenger car tyres suitable for speeds exceeding 210 km/h, but not exceeding 240 km/h (tyres classified with speed category symbol ‘V’), the maximum load rating must not exceed the percentage of the value associated with the load capacity index of the tyre, indicated in the table below, with reference to the speed capability of the vehicle to which the tyre is fitted;

| Maximum speed(km/h) | Load(%) |
|---------------------|---------|
| 215                 | 98,5    |
| 220                 | 97      |
| 225                 | 95,5    |
| 230                 | 94      |
| 235                 | 92,5    |
| 240                 | 91      |

for intermediate maximum speeds linear interpolations of the maximum load rating are allowed;

- 2.31.3. for speeds exceeding 240 km/h (‘Z tyres’) the maximum load rating must not exceed the value specified by the tyre manufacturer with reference to the maximum speed capability of the vehicle to which it is fitted;
- 2.31.4. in the case of commercial vehicle tyres, the maximum load rating, both for single and for dual formation, must not exceed the percentage of the value associated with

the relevant load capacity index of the tyre as indicated in the table 'Load-capacity variation with speed' (see 2.30), with reference to the speed category symbol of the tyre and the speed capability of the vehicle to which the tyre is fitted. When additional load capacity indices and speed category symbols apply, those too are considered to determine the maximum load rating of the tyre;

- 2.32. 'passenger car tyre' means a tyre designed primarily, but not only, for passenger cars (motor vehicles in category M1) and their trailers (01 and 02);
- 2.33. 'commercial vehicle tyre' means a tyre designed primarily, but not only, for vehicles other than passenger cars (motor vehicles in categories M2, M3, N) and their trailers (03, 04);
- 2.34. 'tyre ground pressure ( $F/A_c$ )' means the average until load transmitted by the tyre, through its contact area, to the road surface expressed as the ratio between the vertical force ( $F$ ), in static conditions on the axis of the wheel and the tyre contact area ( $A_c$ ) measured with the tyre inflated at the cold inflation pressure recommended for the intended type of service. It is expressed in  $\text{kN/m}^2$ ;
- 2.35. 'tyre contact area ( $A_c$ )' means the area of the flat surface contained within the virtual perimeter of the tyre footprint. It is expressed in  $\text{m}^2$ ;
- 2.36. 'virtual perimeter of the tyre footprint' means the convex polygonal curve circumscribing the smallest area containing all points of contact between the tyre and the ground;
- 2.37. 'cold inflation pressure' means the internal pressure of the tyre with the tyre at ambient temperature and does not include any pressure build up due to tyre usage. It is expressed in bar kPa.


### 3. MARKING REQUIREMENTS

- 3.1. Tyres must bear:
- 3.1.1. the manufacturer's name or trade mark;
- 3.1.2. the tyre-size designation as defined in section 2.17;
- 3.1.3. an indication of the structure as follows:
- 3.1.3.1. on diagonal (bias-ply) tyres, no marking or the letter 'D';
- 3.1.3.2. on radial-ply tyres, the letter 'R' placed in front of the nominal in diameter marking and, optionally, the word 'RADIAL';
- 3.1.3.3. on bias-belted tyres, the letter 'B' placed in front of the nominal rim diameter marking and, in addition, the words 'BIAS-BELTED';
- 3.1.4. an indication of the tyre's speed category by means of the symbol shown in section 2.29; in the case of tyres suitable for speeds higher than 240 km/h the speed category of the tyre must be indicated by the letter code 'Z' placed in front of the indication of the structure (see section 3.1.3);
- 3.1.5. the inscription 'M + S' (for alternatively 'M.S.' or 'M & S') in the case of a snow tyre;
- 3.1.6. the load-capacity index as defined in section 2.28;

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- 3.1.6.1. however, in the case of tyres suitable for speeds higher than 240 km/h the indication of the load capacity index may be omitted;
- 3.1.7. the word ‘TUBELESS’ if the tyre is designed for use without an inner tube;
- 3.1.8. the word ‘REINFORCED’ if the tyre is a reinforced tyre;
- 3.1.9. the date of manufacture in the form of a group of three digits, the first two showing the week and the last one the year of manufacture;
- 3.1.10. in the case of commercial vehicle tyres which can be regrooved, the symbol ‘’ at last 20 mm in diameter, or the word ‘REGROOVABLE’, moulded into or on to each sidewall;
- 3.1.11. in the case of commercial vehicles tyres, an indication, by the ‘PSI’ index (see Appendix 4), of the inflation pressure to be adopted for the load/speed tests, as explained in Appendix 7 Part B;
- 3.1.12. the additional load capacity index/indices and the speed category symbol in the case where the provisions of section 6.2.5 are applied.
- 3.2. Appendix 3 gives examples of the arrangement of tyre markings.
- 3.3. The tyre must also bear the [F<sup>1</sup>EC type-approval mark, the model of which is given in Annex I, section 4.5.

#### POSITION OF MARKINGS

- 3.4. The markings referred to in section 3.1 and 3.3 must be clearly and legibly moulded into or on to both sidewalls, and at least on one side on the lower sidewall, as follows:
  - 3.4.1. in the case of symmetrical tyres, all the markings referred to above must be located on both sidewalls except the markings referred to in sections 3.1.9, 3.1.11 and 3.3 which may be on one sidewall only;
  - 3.4.2. in the case of asymmetrical tyres all the markings must be located on at least the outer sidewall.

(4.)

.....  
 (5.)

.....  
 (6.) 6.1.

#### **Dimensional requirements**

6.1.1.

##### *Section width of a tyre*

6.1.1.1.

Except as provided by section 6.1.1.2, the section width is calculated by the following formula:

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

where:

S = the ‘section width’ expressed in mm<sup>(4)</sup> and measured on the measuring rim;



|       |   |   |
|-------|---|---|
| $S_1$ | = | the ‘nominal section width’ in mm as shown on the sidewall of the tyre in the tyre-size designation as prescribed;  |
| A     | = | the width (expressed in mm) of the measuring rim, as shown by the manufacturer in the descriptive note, (see section 6.11 of Annex I, Appendix 1);  |
| $A_1$ | = | the width (expressed in mm) of the theoretical rim; it is taken to equal $S_1$ multiplied by the factor $x$ as specified by the tyre manufacturer (see section 6.15 of Annex I, Appendix 1); and $K$ is taken to equal 0.4. |

## 6.1.1.2.

However, for the types of tyre for which the size designation is given in the first column of the tables in Appendix 5 A or 5 B, the measuring rim width (A) and the section width (S) are those given opposite the tyre size designation in those tables.

## 6.1.2.

*Outer diameter of a tyre*

## 6.1.2.1.

Except as provided by section 6.1.2.2, the outer diameter of a tyre is calculated by the following formula:

$$D = d + 0,02H$$

where:

- D is the outer diameter expressed in mm,
- d is the conventional number defined in section 2.17.1.3, expressed in mm,
- H is the nominal section height in mm and is equal to  $S_1 \times 0,01 Ra$ ;

where:

- Ra is the nominal aspect ratio,

all as shown on the sidewall of the tyre in the tyre-size designation in conformity with the requirements of section 3.

## 6.1.2.2.

However, for the types of tyres for which the size designation is given in the first column of the tables of Appendix 5 the outer diameter is that given opposite the tyre size designation in those tables.

## 6.1.3.

*Method of measuring tyre dimensions*

The actual dimensions of tyres are measured as prescribed in Appendix 6.

## 6.1.4.

*Tyre section width: specification of tolerance*

## 6.1.4.1.

The overall width of a tyre may be less than the section width determined pursuant to section 6.1.1 or shown in Appendix 5;

## 6.1.4.2.

It may not exceed that value by more than the following:

## 6.1.4.2.1.

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diagonal (bias-ply) tyres: 6 % for passenger car tyres, 8 % for commercial vehicle tyres;

6.1.4.2.2.

radial-ply tyres: 4 %; and

6.1.4.2.3.

in addition, if the tyre has a special protective band, the figure as increased by the above tolerances may be exceeded by 8 mm.

6.1.4.2.4.

However, for tyres of a section width exceeding 305 mm intended for dual (twin) mounting the nominal value must not be exceeded by more than 2 % for radial-ply or 4 % for diagonal (bias-ply) tyres.

6.1.5.

*Tyre outer diameter: specification of tolerance*

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

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

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

6.1.5.1.

for sizes listed in Appendix 5:

$$H = 0,5 (D - d) \text{ — (for references see section 6.1.2.2).}$$

6.1.5.2.

for other sizes not listed in Appendix 5:

‘H’ and ‘d’ are as defined in section 6.1.2.1.

6.1.5.3.

coefficients ‘a’ and ‘b’ are respectively:

6.1.5.3.1.

coefficient ‘a’ = 0,97;

6.1.5.3.2.

coefficient ‘b’ for normal, special, snow or temporary-use spare tyres

|                 |                     |                          |
|-----------------|---------------------|--------------------------|
| Category of use | Passenger car tyres | Commercial vehicle tyres |
| Radial          | Normal              | Special                  |
| Bias            | Normal              | Special                  |
| Snow            | Normal              | Special                  |
| Temporary-use   | Normal              | Special                  |

1,061,09Snow1,041,081,041,07Temporary-use1,041,08——6.1.5.4.

For snow tyres the outer diameter ( $D_{max}$ ) established in conformity with the above may be exceeded by 1 %.

6.2. *Load/speed test requirement*

6.2.1. The tyre must undergo a load/speed test carried out in accordance with the relevant procedure described in Appendix 7.

6.2.2. A tyre which, after undergoing the relevant load/speed test, does not exhibit any tread separation, ply separation, cord separation, chunking or broken cords is deemed to have passed the test.

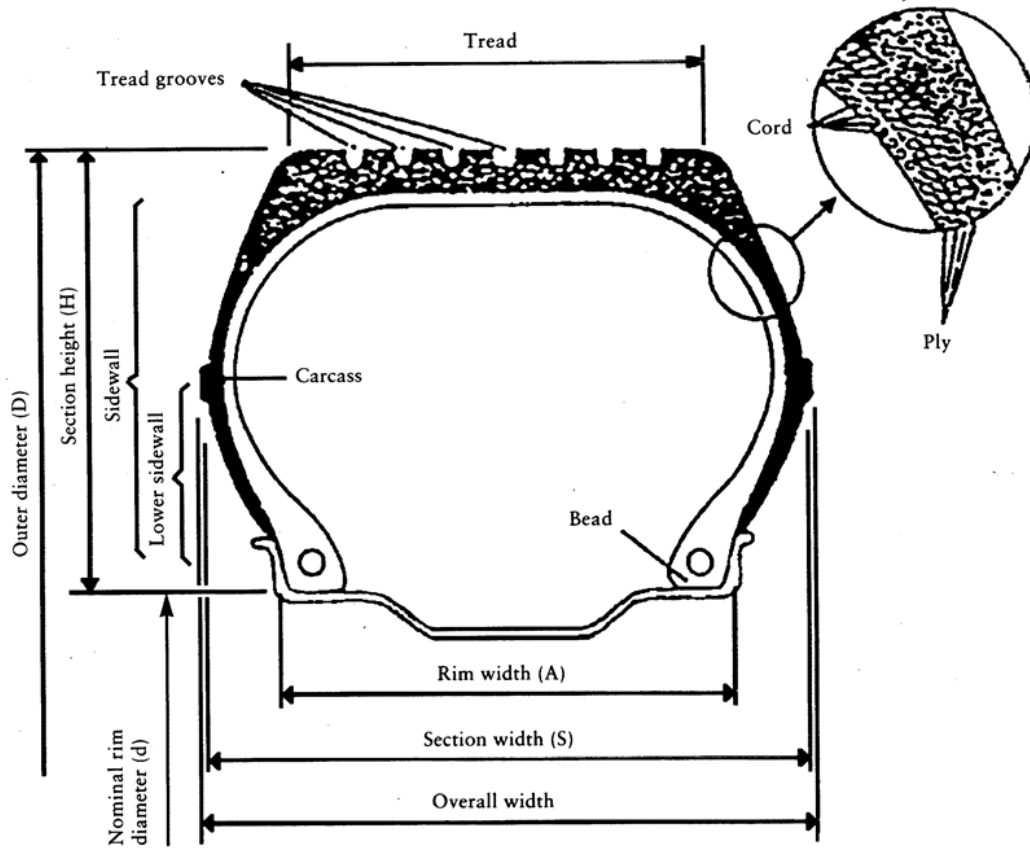
- 6.2.3. The outer diameter of the tyre, measured six hours after the load/speed test, must not be more than 3,5 % greater than the outer diameter as measured before the test.
- 6.2.4. Where application is made for the approval of a type of commercial vehicle tyre the load/speed combinations given in the table in Appendix 8 apply and, the load/speed test prescribed in section 6.2.1 need not be carried out for load and speed values other than the nominal values.
- 6.2.5. Where application (see section 6.13 of Annex 1, Appendix 1) is made for the type-approval of a type of commercial vehicle tyre which has a load/speed combination in addition to the one that is subject to the variation of load with speed given in the table in Appendix 8, the load/speed test prescribed in section 6.2.1 must also be carried out on a second tyre of the same type at the additional load/speed combination.
- 6.2.6. Where a tyre manufacturer produces a range of tyres it is not considered necessary to carry out a load/speed test on every type of tyre in the range. Worst-case selection may be made, at the discretion of the approval authority.
- 6.3. **Tread-wear indicators**
- 6.3.1. In the case of passenger car tyres the tread of the tyre must include not less than six transverse rows of tread-wear indicators, approximately equally spaced and situated in the wide grooves in the central zone of the tread, which covers approximately three quarters of the tread width. The tread-wear indicators must be such that they cannot be confused with the rubber ridges between the ribs or blocks of the tread.
- 6.3.2. However, in the case of tyres of dimensions appropriate for mounting on rims of a nominal diameter of 12" or less, four rows of tread-wear indicators are acceptable.
- 6.3.3. The tread-wear indicators must give visual warning when the depth of the corresponding tread grooves has been reduced to 1,6 mm with a tolerance of + 0,6/- 0 mm.

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## Appendix 1

### Explanatory figure

(see Annex II, sections 2 and 6.1)



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## Appendix 2

LIST OF SYMBOLS OF LOAD-CAPACITY INDICES (LI) AND  
CORRESPONDING MAXIMUM MASS TO BE CARRIED (GK)

(see Annex II, section 2.28)

| <b>LI</b> | <b>Maximum</b> |
|-----------|----------------|
| 0         | 45             |
| 1         | 46,2           |
| 2         | 47,5           |
| 3         | 48,7           |
| 4         | 50             |
| 5         | 51,5           |
| 6         | 53             |
| 7         | 54,5           |
| 8         | 56             |
| 9         | 58             |
| 10        | 60             |
| 11        | 61,5           |
| 12        | 63             |
| 13        | 65             |
| 14        | 67             |
| 15        | 69             |
| 16        | 71             |
| 17        | 73             |
| 18        | 75             |
| 19        | 77,5           |
| 20        | 80             |
| 21        | 82,5           |
| 22        | 85             |
| 23        | 87,5           |
| 24        | 90             |
| 25        | 92,5           |
| 26        | 95             |
| 27        | 97,5           |

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|    |     |
|----|-----|
| 28 | 100 |
| 29 | 103 |
| 30 | 106 |
| 31 | 109 |
| 32 | 112 |
| 33 | 115 |
| 34 | 118 |
| 35 | 121 |
| 36 | 125 |
| 37 | 128 |
| 38 | 132 |
| 39 | 136 |
| 40 | 140 |
| 41 | 145 |
| 42 | 150 |
| 43 | 155 |
| 44 | 160 |
| 45 | 165 |
| 46 | 170 |
| 47 | 175 |
| 48 | 180 |
| 49 | 185 |
| 50 | 190 |
| 51 | 195 |
| 52 | 200 |
| 53 | 206 |
| 54 | 212 |
| 55 | 218 |
| 56 | 224 |
| 57 | 230 |
| 58 | 236 |
| 59 | 240 |
| 60 | 250 |
| 61 | 257 |

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|    |     |
|----|-----|
| 62 | 265 |
| 63 | 272 |
| 64 | 280 |
| 65 | 290 |
| 66 | 300 |
| 67 | 307 |
| 68 | 315 |
| 69 | 325 |
| 70 | 335 |
| 71 | 345 |
| 72 | 355 |
| 73 | 365 |
| 74 | 375 |
| 75 | 387 |
| 76 | 400 |
| 77 | 412 |
| 78 | 425 |
| 79 | 437 |
| 80 | 450 |
| 81 | 462 |
| 82 | 475 |
| 83 | 487 |
| 84 | 500 |
| 85 | 515 |
| 86 | 530 |
| 87 | 545 |
| 88 | 560 |
| 89 | 580 |
| 90 | 600 |
| 91 | 615 |
| 92 | 630 |
| 93 | 650 |
| 94 | 670 |
| 95 | 690 |

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|     |       |
|-----|-------|
| 96  | 710   |
| 97  | 730   |
| 98  | 750   |
| 99  | 775   |
| 100 | 800   |
| 101 | 825   |
| 102 | 850   |
| 103 | 875   |
| 104 | 900   |
| 105 | 925   |
| 106 | 950   |
| 107 | 975   |
| 108 | 1 000 |
| 109 | 1 030 |
| 110 | 1 060 |
| 111 | 1 090 |
| 112 | 1 120 |
| 113 | 1 150 |
| 114 | 1 180 |
| 115 | 1 215 |
| 116 | 1 250 |
| 117 | 1 285 |
| 118 | 1 320 |
| 119 | 1 360 |
| 120 | 1 400 |
| 121 | 1 450 |
| 122 | 1 500 |
| 123 | 1 550 |
| 124 | 1 600 |
| 125 | 1 650 |
| 126 | 1 700 |
| 127 | 1 750 |
| 128 | 1 800 |
| 129 | 1 850 |



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|     |       |
|-----|-------|
| 130 | 1 900 |
| 131 | 1 950 |
| 132 | 2 000 |
| 133 | 2 060 |
| 134 | 2 120 |
| 135 | 2 180 |
| 136 | 2 240 |
| 137 | 2 300 |
| 138 | 2 360 |
| 139 | 2 430 |
| 140 | 2 500 |
| 141 | 2 575 |
| 142 | 2 650 |
| 143 | 2 725 |
| 144 | 2 800 |
| 145 | 2 900 |
| 146 | 3 000 |
| 147 | 3 075 |
| 148 | 3 150 |
| 149 | 3 250 |
| 150 | 3 350 |
| 151 | 3 450 |
| 152 | 3 550 |
| 153 | 3 650 |
| 154 | 3 750 |
| 155 | 3 875 |
| 156 | 4 000 |
| 157 | 4 125 |
| 158 | 4 250 |
| 159 | 4 375 |
| 160 | 4 500 |
| 161 | 4 625 |
| 162 | 4 750 |
| 163 | 4 875 |

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|     |        |
|-----|--------|
| 164 | 5 000  |
| 165 | 5 150  |
| 166 | 5 300  |
| 167 | 5 450  |
| 168 | 5 600  |
| 169 | 5 800  |
| 170 | 6 000  |
| 171 | 6 150  |
| 172 | 6 300  |
| 173 | 6 500  |
| 174 | 6 700  |
| 175 | 6 900  |
| 176 | 7 100  |
| 177 | 7 300  |
| 178 | 7 500  |
| 179 | 7 750  |
| 180 | 8 000  |
| 181 | 8 250  |
| 182 | 8 500  |
| 183 | 8 750  |
| 184 | 9 000  |
| 185 | 9 250  |
| 186 | 9 500  |
| 187 | 9 750  |
| 188 | 10 000 |
| 189 | 10 300 |
| 190 | 10 600 |
| 191 | 10 900 |
| 192 | 11 200 |
| 193 | 11 500 |
| 194 | 11 800 |
| 195 | 12 150 |
| 196 | 12 500 |
| 197 | 12 850 |

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|     |        |
|-----|--------|
| 198 | 13 200 |
| 199 | 13 600 |
| 200 | 14 000 |

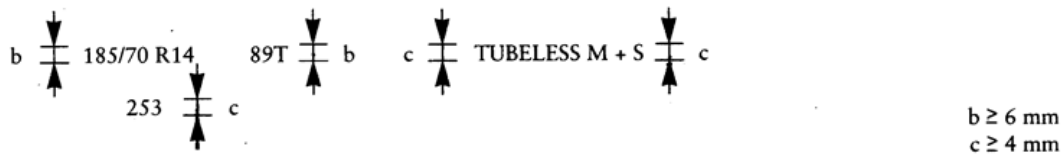
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### Appendix 3

#### ARRANGEMENT OF TYRE MARKINGS

(see Annex II, section 3.2)

##### PART A: PASSENGER CAR TYRES



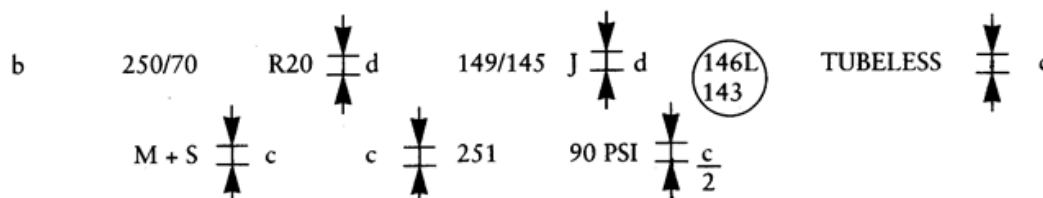
These markings define a tyre:

- having a nominal section width of 185,
- having a nominal aspect ratio of 70,
- of radial-ply structure (R),
- having a nominal rim diameter of 14,
- having a load capacity of 580 kg, corresponding to load index 89 in Appendix 2,
- classified in the speed category T (maximum speed 190 km/h),
- for fitting without an inner tube ('tubeless'),
- of 'snow' type,
- manufactured during the twenty-fifth week of the year 1993.

The positioning and order of the markings constituting the tyre designation are as follows:

- (a) the size designation, comprising the nominal section width, the nominal aspect ratio, the type of structure symbol (where applicable) and the nominal rim diameter, must be grouped as shown in the above example: 185/70 R 14;
- (b) the load index and the speed category symbol are placed near the size designation. They may either precede or follow it or be placed above or below it;
- (c) the symbols 'tubeless', 'reinforced', and 'M + S' may be at a distance from the size designation.

## PART B: COMMERCIAL VEHICLE TYRES



| MINIMUM HEIGHTS OF MARKINGS<br>(mm) |  |  |
|-------------------------------------|--|--|
|                                     | Tyres of rim diameter < 20" or < 508 mm or of section width ≤ 235 mm or ≤ 9" | Tyres of rim diameter ≥ 20" or ≥ 508 mm or of section width > 235 mm or > 9" |
| b                                   | 6  | 9  |
| c                                   | 4  |  |
| d                                   | 6  |  |

These markings define a tyre:

- having a nominal section width of 250,
- having a nominal aspect ratio of 70,
- of radial-ply structure (R),
- having a nominal rim diameter of 508 mm, for which the symbol is 20,
- having load capacities of 3 250 kg when single and 2 900 kg when twinned (dual), corresponding respectively to the load capacity indices 149 and 145 shown in Appendix 2,
- classified in the nominal speed category J (reference speed 100 km/h),
- able to be used additionally in speed category L (reference speed 120 km/h) with a load capacity of 3 000 kg when single and 2 725 kg when twinned (dual), corresponding respectively to the load capacity indices 146 and 143 shown in Appendix 2,
- for fitting without an inner tube 'tubeless',
- of 'snow' type,
- manufactured during the twenty-fifth week of the year 1991, and
- requiring to be inflated to 620 kPa for load/speed endurance tests, for which the PSI symbol is 90.

The positioning and order of the markings constituting the tyre designation are as follows:

- (a) the size designation, comprising the nominal section width, the nominal aspect ratio, the type-of-structure symbol (where applicable) and the nominal rim diameter, must be grouped as shown in the above example: 250/70 R 20;

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- (b) the load indices and the speed category symbol are placed together near the size designation. They may either precede or follow it or be placed above or below it;
- (c) the symbols 'Tubeless', 'M + S' and 'REGROOVABLE' may be at a distance from the size designation;
- (d) if section 6.2.5 of Annex II is applied the additional load-capacity indices and speed-category symbol must be shown inside a circle near the nominal load-capacity indices and speed category symbol appearing on the tyre sidewall.

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#### Appendix 4

#### RELATIONSHIP BETWEEN THE PRESSURE INDEX AND THE UNITS OF PRESSURE

(see Annex II, Appendix 7, Part B, section 1.3)

| <b>Pressure Index('PSI')</b> | <b>bar</b> | <b>kPa</b> |
|------------------------------|------------|------------|
| 20                           | 1.4        | 140        |
| 25                           | 1.7        | 170        |
| 30                           | 2.1        | 210        |
| 35                           | 2.4        | 240        |
| 40                           | 2.8        | 280        |
| 45                           | 3.1        | 310        |
| 50                           | 3.4        | 340        |
| 55                           | 3.8        | 380        |
| 60                           | 4.2        | 420        |
| 65                           | 4.5        | 450        |
| 70                           | 4.8        | 480        |
| 75                           | 5.2        | 520        |
| 80                           | 5.5        | 550        |
| 85                           | 5.9        | 590        |
| 90                           | 6.2        | 620        |
| 95                           | 6.6        | 660        |
| 100                          | 6.9        | 690        |
| 105                          | 7.2        | 720        |
| 110                          | 7.6        | 760        |
| 115                          | 7.9        | 790        |
| 120                          | 8.3        | 830        |
| 125                          | 8.6        | 860        |
| 130                          | 9.0        | 900        |
| 135                          | 9.3        | 930        |
| 140                          | 9.7        | 970        |
| 145                          | 10.0       | 1 000      |
| 150                          | 10.3       | 1 030      |

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## Appendix 5

### MEASURING RIM, OUTER DIAMETER AND SECTION WIDTH OF TYRES OF CERTAIN SIZE DESIGNATIONS

(see Annex II, sections 6.1.1.2 and 6.1.2.2)

#### PART A: PASSENGER CAR TYRES

TABLE 1

Tyres in diagonal construction

| <b>Tyre size designation</b> | <b>Measuring rim width(inches)</b> | <b>Outer diameter<sup>a</sup>(in mm)</b> | <b>Section width<sup>a</sup>(in mm)</b> |
|------------------------------|------------------------------------|--|---|
| <b>Super balloon series</b>  |                                    |  |   |
| 4.80-10                      | 3.5                                | 490                                      | 128                                     |
| 5.20-10                      | 3.5                                | 508                                      | 132                                     |
| 5.20-12                      | 3.5                                | 558                                      | 132                                     |
| 5.60-13                      | 4                                  | 600                                      | 145                                     |
| 5.90-13                      | 4                                  | 616                                      | 150                                     |
| 6.40-13                      | 4.5                                | 642                                      | 163                                     |
| 5.20-14                      | 3.5                                | 612                                      | 132                                     |
| 5.60-14                      | 4                                  | 626                                      | 145                                     |
| 5.90-14                      | 4                                  | 642                                      | 150                                     |
| 6.40-14                      | 4.5                                | 666                                      | 163                                     |
| 5.60-15                      | 4                                  | 650                                      | 145                                     |
| 5.90-15                      | 4                                  | 668                                      | 150                                     |
| 6.40-15                      | 4.5                                | 692                                      | 163                                     |
| 6.70-15                      | 4.5                                | 710                                      | 170                                     |
| 7.10-15                      | 5                                  | 724                                      | 180                                     |
| 7.60-15                      | 5.5                                | 742                                      | 193                                     |
| 8.20-15                      | 6                                  | 760                                      | 213                                     |
| <b>Low section series</b>    |                                    |  |   |
| 5.50-12                      | 4                                  | 552                                      | 142                                     |
| 6.00-12                      | 4.5                                | 574                                      | 156                                     |
| 7.00-13                      | 5                                  | 644                                      | 178                                     |

**a** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

**b** The following size designations are accepted:  
185-14/7.35-14 or 185-14 or 7.35-14 or 7.35-14/185-14.



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TABLE 1

## Tyres in diagonal construction

|   |     |     |     |
|---|-----|-----|-----|
| 7.00-14                                     | 5   | 668 | 178 |
| 7.50-14                                     | 5.5 | 688 | 190 |
| 8.00-14                                     | 6   | 702 | 203 |
| 6.00-15 L                                   | 4.5 | 650 | 156 |
| <b>Super low section series<sup>b</sup></b> |     |     |     |
| 155-13/6.15-13                              | 4.5 | 582 | 157 |
| 165-13/6.45-13                              | 4.5 | 600 | 167 |
| 175-13/6.95-13                              | 5   | 610 | 178 |
| 155-14/6.15-14                              | 4.5 | 608 | 157 |
| 165-14/6.45-14                              | 4.5 | 626 | 167 |
| 175-14/6.95-14                              | 5   | 638 | 178 |
| 185-14/7.35-14                              | 5.5 | 654 | 188 |
| 195-14/7.75-14                              | 5.5 | 670 | 198 |
| <b>Ultra low section</b>                    |     |     |     |
| 5.9-10                                      | 4.5 | 483 | 148 |
| 6.5-13                                      | 4.5 | 586 | 166 |
| 6.9-13                                      | 4.5 | 600 | 172 |
| 7.3-13                                      | 5   | 614 | 184 |

**a** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

**b** The following size designations are accepted:  
185-14/7.35-14 or 185-14 or 7.35-14 or 7.35-14/185-14.

TABLE 2

## Tyres in radial construction

| <b>Tyre size designation</b> | <b>Measuring rim width(inches)</b> | <b>Outer diameter<sup>a</sup>(in mm)</b> | <b>Section width<sup>a</sup>(in mm)</b> |
|------------------------------|------------------------------------|--|---|
| 5.60 R 13                    | 4                                  | 606                                      | 145                                     |
| 5.90 R 13                    | 4.5                                | 626                                      | 155                                     |
| 6.40 R 13                    | 4.5                                | 640                                      | 170                                     |
| 7.00 R 13                    | 5                                  | 644                                      | 178                                     |
| 7.25 R 13                    | 5                                  | 654                                      | 184                                     |
| 5.90 R 14                    | 4.5                                | 654                                      | 155                                     |
| 5.60 R 15                    | 4                                  | 656                                      | 145                                     |

**a** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

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TABLE 2

## Tyres in radial construction

|           |     |     |     |
|-----------|-----|-----|-----|
| 6.40 R 15 | 4.5 | 690 | 170 |
| 6.70 R 15 | 5   | 710 | 180 |
| 140 R 12  | 4   | 538 | 138 |
| 150 R 12  | 4   | 554 | 150 |
| 150 R 13  | 4   | 580 | 149 |
| 160 R 13  | 4.5 | 596 | 158 |
| 170 R 13  | 5   | 608 | 173 |
| 150 R 14  | 4   | 606 | 149 |
| 180 R 15  | 5   | 676 | 174 |

**a** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 3

## Millimetric series — radial

| <b>Tyre size designation<sup>b</sup></b> | <b>Measuring rim width(inches)</b> | <b>Outer diameter<sup>a</sup>(in mm)</b> | <b>Section width<sup>a</sup>(in mm)</b> |
|--|------------------------------------|--|---|
| 125 R 10                                 | 3.5                                | 459                                      | 127                                     |
| 145 R 10                                 | 4                                  | 492                                      | 147                                     |
| 125 R 12                                 | 3.5                                | 510                                      | 178                                     |
| 135 R 12                                 | 4                                  | 522                                      | 184                                     |
| 145 R 12                                 | 4                                  | 542                                      |   |
| 155 R 12                                 | 4.5                                | 550                                      | 155                                     |
| 125 R 13                                 | 3.5                                | 536                                      | 127                                     |
| 135 R 13                                 | 4                                  | 548                                      | 137                                     |
| 145 R 13                                 | 4                                  | 566                                      | 147                                     |
| 155 R 13                                 | 4.5                                | 578                                      | 157                                     |
| 165 R 13                                 | 4.5                                | 596                                      | 167                                     |
| 175 R 13                                 | 5                                  | 608                                      | 178                                     |
| 185 R 13                                 | 5.5                                | 624                                      | 188                                     |

**a** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

**b** On certain tyres the rim diameter can be expressed in mm:

10" = 255

12" = 305

13" = 330

14" = 355

15" = 380

16" = 405

(example: 125 R 225).

## ANNEX II

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TABLE 3

## Millimetric series — radial

|          |     |     |     |
|----------|-----|-----|-----|
| 125 R 14 | 3.5 | 562 | 127 |
| 135 R 14 | 4   | 574 | 137 |
| 145 R 14 | 4   | 590 | 147 |
| 155 R 14 | 4.5 | 604 | 157 |
| 165 R 14 | 4.5 | 622 | 167 |
| 175 R 14 | 5   | 634 | 178 |
| 185 R 14 | 5.5 | 650 | 188 |
| 195 R 14 | 5.5 | 666 | 198 |
| 205 R 14 | 6   | 686 | 208 |
| 215 R 14 | 6   | 700 | 218 |
| 225 R 14 | 6.5 | 714 | 228 |
| 125 R 15 | 3.5 | 588 | 127 |
| 135 R 15 | 4   | 600 | 137 |
| 145 R 15 | 4   | 616 | 147 |
| 155 R 15 | 4.5 | 630 | 157 |
| 165 R 15 | 4.5 | 646 | 167 |
| 175 R 15 | 5   | 660 | 178 |
| 185 R 15 | 5.5 | 674 | 188 |
| 195 R 15 | 5.5 | 690 | 198 |
| 205 R 15 | 6   | 710 | 208 |
| 215 R 15 | 6   | 724 | 218 |
| 225 R 15 | 6.5 | 738 | 228 |
| 235 R 15 | 6.5 | 752 | 238 |
| 175 R 16 | 5   | 686 | 178 |
| 185 R 16 | 5.5 | 698 | 188 |
| 205 R 16 | 6   | 736 | 208 |

**a** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

**b** On certain tyres the rim diameter can be expressed in mm:

10" = 255

12" = 305

13" = 330

14" = 355

15" = 380

16" = 405

(example: 125 R 225).

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TABLE 4

70 Series — Radial<sup>a</sup>

| <b>Tyre size designation</b> | <b>Measuring rim width(inches)</b> | <b>Outer diameter<sup>b</sup>(in mm)</b> | <b>Section width<sup>b</sup>(in mm)</b> |
|------------------------------|------------------------------------|--|---|
| 145/70 R 10                  | 3.5                                | 462                                      | 139                                     |
| 155/70 R 10                  | 3.5                                | 474                                      | 146                                     |
| 165/70 R 10                  | 4.5                                | 494                                      | 165                                     |
| 145/70 R 12                  | 4                                  | 512                                      | 144                                     |
| 155/70 R 12                  | 4                                  | 524                                      | 151                                     |
| 165/70 R 12                  | 4.5                                | 544                                      | 165                                     |
| 175/70 R 12                  | 5                                  | 552                                      | 176                                     |
| 145/70 R 13                  | 4                                  | 538                                      | 144                                     |
| 155/70 R 13                  | 4                                  | 550                                      | 151                                     |
| 165/70 R 13                  | 4.5                                | 568                                      | 165                                     |
| 175/70 R 13                  | 4.5                                | 580                                      | 176                                     |
| 185/70 R 13                  | 5                                  | 598                                      | 186                                     |
| 195/70 R 13                  | 5.5                                | 608                                      | 197                                     |
| 205/70 R 13                  | 5.5                                | 625                                      | 204                                     |
| 145/70 R 14                  | 4                                  | 564                                      | 144                                     |
| 155/70 R 14                  | 4                                  | 576                                      | 151                                     |
| 165/70 R 14                  | 4.5                                | 592                                      | 165                                     |
| 175/70 R 14                  | 5                                  | 606                                      | 176                                     |
| 185/70 R 14                  | 5                                  | 624                                      | 186                                     |
| 195/70 R 14                  | 5.5                                | 636                                      | 197                                     |
| 205/70 R 14                  | 5.5                                | 652                                      | 206                                     |
| 215/70 R 14                  | 6                                  | 665                                      | 217                                     |
| 225/70 R 14                  | 6                                  | 677                                      | 225                                     |
| 235/70 R 14                  | 6.5                                | 694                                      | 239                                     |
| 245/70 R 14                  | 6.5                                | 705                                      | 243                                     |
| 145/70 R 15                  | 4                                  | 590                                      | 144                                     |
| 155/70 R 15                  | 4                                  | 602                                      | 151                                     |
| 165/70 R 15                  | 4.5                                | 618                                      | 165                                     |

**a** Dimensional data applicable to some tyres in existence. For new approvals, dimensions calculated according to sections 6.1.1.1 and 6.1.2.1 of Annex II apply.

**b** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

## ANNEX II

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TABLE 4

70 Series — Radial<sup>a</sup>

|             |     |     |     |
|-------------|-----|-----|-----|
| 175/70 R 15 | 5   | 632 | 176 |
| 185/70 R 15 | 5   | 648 | 186 |
| 195/70 R 15 | 5.5 | 656 | 197 |
| 205/70 R 15 | 5.5 | 669 | 202 |
| 215/70 R 15 | 6   | 682 | 213 |
| 225/70 R 15 | 6   | 696 | 220 |
| 235/70 R 15 | 6.5 | 712 | 234 |
| 245/70 R 15 | 6.5 | 720 | 239 |

**a** Dimensional data applicable to some tyres in existence. For new approvals, dimensions calculated according to sections 6.1.1.1 and 6.1.2.1 of Annex II apply.

**b** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 5

60 Series radial<sup>a</sup>

| <b>Tyre size designation</b> | <b>Measuring rim width(inches)</b> | <b>Outer diameter<sup>b</sup>(in mm)</b> | <b>Section width<sup>b</sup>(in mm)</b> |
|------------------------------|------------------------------------|--|---|
| 165/60 R 12                  | 5                                  | 504                                      | 167                                     |
| 165/60 R 13                  | 5                                  | 530                                      | 167                                     |
| 175/60 R 13                  | 5.5                                | 536                                      | 178                                     |
| 185/60 R 13                  | 5.5                                | 548                                      | 188                                     |
| 195/60 R 13                  | 6                                  | 566                                      | 198                                     |
| 205/60 R 13                  | 6                                  | 578                                      | 208                                     |
| 215/60 R 13                  | 6                                  | 594                                      | 218                                     |
| 225/60 R 13                  | 6.5                                | 602                                      | 230                                     |
| 235/60 R 13                  | 6.5                                | 614                                      | 235                                     |
| 165/60 R 14                  | 5                                  | 554                                      | 167                                     |
| 175/60 R 14                  | 5.5                                | 562                                      | 178                                     |
| 185/60 R 14                  | 5.5                                | 574                                      | 188                                     |
| 195/60 R 14                  | 6                                  | 590                                      | 198                                     |
| 205/60 R 14                  | 6                                  | 604                                      | 208                                     |
| 215/60 R 14                  | 6                                  | 610                                      | 215                                     |
| 225/60 R 14                  | 6                                  | 620                                      | 220                                     |

**a** Dimensional data applicable to some tyres in existence. For new approvals, dimensions calculated according to sections 6.1.1.1 and 6.1.2.1 of Annex III apply.

**b** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

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TABLE 5

60 Series radial<sup>a</sup>

|             |     |     |     |
|-------------|-----|-----|-----|
| 235/60 R 14 | 6.5 | 630 | 231 |
| 245/60 R 14 | 6.5 | 642 | 237 |
| 265/60 R 14 | 7   | 670 | 260 |
| 185/60 R 15 | 5.5 | 600 | 188 |
| 195/60 R 15 | 6   | 616 | 198 |
| 205/60 R 15 | 6   | 630 | 208 |
| 215/60 R 15 | 6   | 638 | 216 |
| 225/60 R 15 | 6.5 | 652 | 230 |
| 235/60 R 15 | 6.5 | 664 | 236 |
| 255/60 R 15 | 7   | 688 | 255 |
| 205/60 R 16 | 6   | 654 | 208 |
| 215/60 R 16 | 6   | 662 | 215 |
| 225/60 R 16 | 6   | 672 | 226 |
| 235/60 R 16 | 6.5 | 684 | 232 |

**a** Dimensional data applicable to some tyres in existence. For new approvals, dimensions calculated according to sections 6.1.1.1 and 6.1.2.1 of Annex III apply.

**b** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 6

## High flotation tyres — radial

| <b>Tyre size designation</b> | <b>Measuring rim width(inches)</b> | <b>Outer diameter<sup>a</sup>(in mm)</b> | <b>Section width<sup>a</sup>(in mm)</b> |
|------------------------------|------------------------------------|--|---|
| 27 × 8.50 R 14               | 7                                  | 674                                      | 218                                     |
| 30 × 9.50 R 15               | 7.5                                | 750                                      | 240                                     |
| 31 × 10.50 R 15              | 8.5                                | 775                                      | 268                                     |
| 31 × 11.50 R 15              | 9                                  | 775                                      | 290                                     |
| 32 × 11.50 R 15              | 9                                  | 801                                      | 290                                     |
| 33 × 12.50 R 15              | 10                                 | 826                                      | 318                                     |

**a** Tolerances: see sections 6.1.4 and 6.1.5 of Annex II.

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## PART B: COMMERCIAL VEHICLE TYRES

TABLE 1

Commercial vehicle tyres

RADIAL NORMAL SECTION SIZES MOUNTED ON 5°-TAPERED OR FLAT BASE RIMS

| <b>Tyre size designation</b>  | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|-------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 6.50 R 20                     | 5.00                                  | 860                          | 181                         |
| 7.00 R 16                     | 5.50                                  | 784                          | 198                         |
| 7.00 R 18                     | 5.50                                  | 842                          | 198                         |
| 7.00 R 20                     | 5.50                                  | 892                          | 198                         |
| 7.50 R 16 and/or A16 or 1-16  | 6.00                                  | 802                          | 210                         |
| 7.50 R 17 and/or A17 or 1-17  | 6.00                                  | 852                          | 210                         |
| 7.50 R 20 and/or A20 or 1-20  | 6.00                                  | 928                          | 210                         |
| 8.25 R 16 and/or B16 or 2-16  | 6.50                                  | 860                          | 230                         |
| 8.25 R 17 and/or B17 or 2-17  | 6.50                                  | 886                          | 230                         |
| 8.25 R 20 and/or B20 or 2-20  | 6.50                                  | 962                          | 230                         |
| 9.00 R 16 and/or C16 or 3-16  | 6.50                                  | 912                          | 246                         |
| 9.00 R 20 and/or C20 or 3-20  | 7.00                                  | 1 018                        | 258                         |
| 10.00 R 20 and/or D20 or 4-20 | 7.50                                  | 1 052                        | 275                         |
| 10.00 R 22 and/or D22 or 4-22 | 7.50                                  | 1 102                        | 275                         |
| 11.00 R 16                    | 6.50                                  | 980                          | 279                         |
| 11.00 R 20 and/or E20 or 5-20 | 8.00                                  | 1 082                        | 286                         |
| 11.00 R 22 and/or E22 or 5-22 | 8.00                                  | 1 132                        | 286                         |
| 11.00 R 24 and/or E24 or 5-24 | 8.00                                  | 1 182                        | 286                         |
| 12.00 R 20 and/or F20 or 6-20 | 8.50                                  | 1 122                        | 313                         |

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TABLE 1

## Commercial vehicle tyres

## RADIAL NORMAL SECTION SIZES MOUNTED ON 5°-TAPERED OR FLAT BASE RIMS

|                               |       |       |     |
|-------------------------------|-------|-------|-----|
| 12.00 R 22                    | 8.50  | 1 174 | 313 |
| 12.00 R 24 and/or F24 or 6-24 | 8.50  | 1 226 | 313 |
| 13.00 R 20                    | 9.00  | 1 176 | 336 |
| 14.00 R 20 and/or G20 or 7-20 | 10.00 | 1 238 | 370 |
| 14.00 R 22                    | 10.00 | 1 290 | 370 |
| 14.00 R 24                    | 10.00 | 1 340 | 370 |

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 2

## Commercial vehicle tyres

## DIAGONAL

## DIAGONAL NORMAL SECTION SIZES MOUNTED ON 5°-TAPERED OR FLAT BASE RIMS

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 7.00-16                      | 5.50                                  | 774                          | 198                         |
| 7.00-20                      | 5.50                                  | 898                          | 198                         |
| 7.50-16 and/or A16 or 1-16   | 6.00                                  | 806                          | 210                         |
| 7.50-17 and/or A17 or 1-17   | 6.00                                  | 852                          | 210                         |
| 7.50-20 and/or A20 or 1-20   | 6.00                                  | 928                          | 213                         |
| 8.25-16 and/or B16 or 2-16   | 6.50                                  | 860                          | 234                         |
| 8.25-17 and/or B17 or 2-17   | 6.50                                  | 895                          | 234                         |
| 8.25-20 and/or B20 or 2-20   | 6.50                                  | 970                          | 234                         |
| 9.00-16                      | 6.50                                  | 900                          | 252                         |
| 9.00-20 and/or C20 or 3-20   | 7.00                                  | 1 012                        | 256                         |



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TABLE 2

## Commercial vehicle tyres

## DIAGONAL

## DIAGONAL NORMAL SECTION SIZES MOUNTED ON 5°-TAPERED OR FLAT BASE RIMS

|                                |       |       |     |
|--------------------------------|-------|-------|-----|
| 9.00-24 and/or C24<br>or 3-24  | 7.00  | 1 114 | 256 |
| 10.00-20 and/or D20<br>or 4-20 | 7.50  | 1 050 | 275 |
| 10.00-22 and/or D22<br>or 4-22 | 7.50  | 1 102 | 275 |
| 11.00-20 and/or E20<br>or 5-20 | 8.00  | 1 080 | 291 |
| 11.00-22 and/or E22<br>or 5-22 | 8.00  | 1 130 | 291 |
| 11.00-24 and/or E24<br>or 5-24 | 8.00  | 1 180 | 291 |
| 12.00-18                       | 8.50  | 1 070 | 312 |
| 12.00-20 and/or F20<br>or 6-20 | 8.50  | 1 120 | 312 |
| 12.00-22 and/or F22<br>or 6-22 | 8.50  | 1 172 | 312 |
| 12.00-24 and/or F24<br>or 6-24 | 8.50  | 1 220 | 312 |
| 13.00-20                       | 9.00  | 1 170 | 342 |
| 14.00-20 and/or G20<br>or 7-20 | 10.00 | 1 238 | 375 |
| 14.00-22 and/or G22<br>or 7-22 | 10.00 | 1 290 | 375 |
| 14.00-24 and/or G24<br>or 7-24 | 10.00 | 1 340 | 375 |
| 15.00-20                       | 11.25 | 1 295 | 412 |
| 16.00-20                       | 13.00 | 1 370 | 446 |

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

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TABLE 3

## Commercial vehicle tyres

## RADIAL NORMAL SECTION SIZES MOUNTED ON 15°-TAPERED RIMS (DROP-CENTRE)

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 8 R 17.5                     | 6.00                                  | 784                          | 208                         |
| 8.5 R 17.5                   | 6.00                                  | 802                          | 215                         |
| 9 R 17.5                     | 6.75                                  | 820                          | 230                         |
| 9.5 R 17.5                   | 6.75                                  | 842                          | 240                         |
| 10 R 17.5                    | 7.50                                  | 858                          | 254                         |
| 11 R 17.5                    | 8.25                                  | 900                          | 279                         |
| 7 R 19.5                     | 5.25                                  | 800                          | 185                         |
| 8 R 19.5                     | 6.00                                  | 856                          | 208                         |
| 8 R 22.5                     | 6.00                                  | 936                          | 208                         |
| 9 R 19.5                     | 6.75                                  | 894                          | 230                         |
| 9 R 22.5                     | 6.75                                  | 970                          | 230                         |
| 9.5 R 19.5                   | 6.75                                  | 916                          | 240                         |
| 10 R 19.5                    | 7.50                                  | 936                          | 254                         |
| 10 R 22.5                    | 7.50                                  | 1 020                        | 254                         |
| 11 R 19.5                    | 8.25                                  | 970                          | 279                         |
| 11 R 22.5                    | 8.25                                  | 1 050                        | 279                         |
| 11 R 24.5                    | 8.25                                  | 1 100                        | 279                         |
| 12 R 19.5                    | 9.00                                  | 1 008                        | 300                         |
| 12 R 22.5                    | 9.00                                  | 1 084                        | 300                         |
| 13 R 22.5                    | 9.75                                  | 1 124                        | 320                         |

TABLE 4

## DIAGONAL NORMAL SECTION SIZES MOUNTED ON 15°-TAPERED RIMS (DROP-CENTRE)

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 8-19.5                       | 6.00                                  | 856                          | 208                         |
| 9-19.5                       | 6.75                                  | 894                          | 230                         |
| 9-22.5                       | 6.75                                  | 970                          | 230                         |
| 10-22.5                      | 7.50                                  | 1 020                        | 254                         |

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TABLE 4

## DIAGONAL NORMAL SECTION SIZES MOUNTED ON 15°-TAPERED RIMS (DROP-CENTRE)

|         |      |       |     |
|---------|------|-------|-----|
| 11-22.5 | 8.25 | 1 054 | 279 |
| 11-24.5 | 8.25 | 1 100 | 279 |
| 12-22.5 | 9.00 | 1 084 | 300 |

*Tolerance:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 5

## Commercial vehicle tyres

## RADIAL 'WIDE BASE' SIZES MOUNTED ON 15°-TAPERED RIMS (DROP-CENTRE)

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 14 R 19.5                    | 10.50                                 | 962                          | 349                         |
| 15 R 19.5                    | 11.75                                 | 998                          | 387                         |
| 15 R 22.5                    | 11.75                                 | 1 074                        | 387                         |
| 16.5 R 19.5                  | 13.00                                 | 1 046                        | 425                         |
| 16.5 R 22.5                  | 13.00                                 | 1 122                        | 425                         |
| 18 R 19.5                    | 14.00                                 | 1 082                        | 457                         |
| 18 R 22.5                    | 14.00                                 | 1 158                        | 457                         |
| 19.5 R 19.5                  | 15.00                                 | 1 134                        | 495                         |
| 21 R 22.5                    | 16.50                                 | 1 246                        | 540                         |

TABLE 6

## DIAGONAL 'WIDE BASE' SIZES MOUNTED ON 15°-TAPERED RIMS (DROP-CENTRE)

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 15-19.5                      | 11.75                                 | 1 004                        | 387                         |
| 15-22.5                      | 11.75                                 | 1 080                        | 387                         |
| 16.5-19.5                    | 13.00                                 | 1 052                        | 425                         |
| 16.5-22.5                    | 13.00                                 | 1 128                        | 425                         |
| 18-19.5                      | 14.00                                 | 1 080                        | 457                         |
| 18-22.5                      | 14.00                                 | 1 156                        | 457                         |
| 19.5-19.5                    | 15.00                                 | 1 138                        | 495                         |
| 21-22.5                      | 16.50                                 | 1 246                        | 540                         |

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*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 7

Commercial vehicle tyres

RADIAL '80' SERIES MOUNTED ON 5° TAPERED OR FLAT-BASE RIMS

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 12/80 R 20                   | 8.50                                  | 1 008                        | 305                         |
| 13/80 R 20                   | 9.00                                  | 1 048                        | 326                         |
| 14/80 R 20                   | 10.00                                 | 1 090                        | 350                         |
| 14/80 R 24                   | 10.00                                 | 1 192                        | 350                         |
| 14.75/80 R 20                | 10.00                                 | 1 124                        | 370                         |
| 15.5/80 R 20                 | 10.00                                 | 1 158                        | 384                         |

TABLE 8

RADIAL '70' SERIES MOUNTED ON 15° TAPERED RIMS (DROP-CENTRE)

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 9/70 R 22.5                  | 6.75                                  | 892                          | 229                         |
| 10/70 R 22.5                 | 7.50                                  | 928                          | 254                         |
| 11/70 R 22.5                 | 8.25                                  | 962                          | 279                         |
| 12/70 R 22.5                 | 9.00                                  | 999                          | 305                         |
| 13/70 R 22.5                 | 9.75                                  | 1 033                        | 330                         |

TABLE 9

RADIAL '80' SERIES MOUNTED ON 15° TAPERED RIMS (DROP-CENTRE)

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 12/80 R 22.5                 | 9.00                                  | 1 046                        | 305                         |

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 10

Commercial vehicle tyres

RADIAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON RIM OF 16" DIAMETER AND OVER

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 6.00 R 16 C                  | 4.50                                  | 728                          | 170                         |

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TABLE 10

## Commercial vehicle tyres

## RADIAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON RIM OF 16" DIAMETER AND OVER

|              |      |     |     |
|--------------|------|-----|-----|
| 6.00 R 18 C  | 4.00 | 782 | 165 |
| 6.50 R 16 C  | 4.50 | 742 | 176 |
| 6.50 R 17 C  | 4.50 | 772 | 176 |
| 6.50 R 17 LC | 4.50 | 726 | 166 |
| 6.50 R 20 C  | 5.00 | 860 | 181 |
| 7.00 R 16 C  | 5.50 | 778 | 198 |
| 7.50 R 16 C  | 6.00 | 802 | 210 |
| 7.50 R 17 C  | 6.00 | 852 | 210 |

TABLE 11

## DIAGONAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON RIM OF 16" DIAMETER AND OVER

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 6.00-16 C                    | 4.50                                  | 730                          | 170                         |
| 6.00-18 C                    | 4.00                                  | 786                          | 165                         |
| 6.00-20 C                    | 5.00                                  | 842                          | 172                         |
| 6.50-20 C                    | 4.50                                  | 748                          | 176                         |
| 6.50-17 LC                   | 4.50                                  | 726                          | 166                         |
| 6.50-20 C                    | 5.00                                  | 870                          | 181                         |
| 7.00-16 C                    | 5.50                                  | 778                          | 198                         |
| 7.00-18 C                    | 5.50                                  | 848                          | 198                         |
| 7.00-20 C                    | 5.50                                  | 898                          | 198                         |
| 7.50-16 C                    | 6.00                                  | 806                          | 210                         |
| 7.50-17 C                    | 6.00                                  | 852                          | 210                         |
| 8.25-16 C                    | 6.50                                  | 860                          | 234                         |
| 8.90-16 C                    | 6.50                                  | 885                          | 250                         |
| 9.00-16 C                    | 6.50                                  | 900                          | 252                         |

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 12

## Commercial vehicle tyres

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### RADIAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON 5° TAPERED RIMS

Rim diameter 12" — 15"

(DROP-CENTRE)

| Tyre size designation         | Measuring-rim width(in inches) | Outer diameter(in mm) | Section width(in mm) |
|-------------------------------|--------------------------------|-----------------------|----------------------|
| <b>'Super balloon' series</b> |                                |                       |                      |
| 5.60 R 12 C                   | 4.00                           | 570                   | 150                  |
| 6.40 R 13 C                   | 5.00                           | 648                   | 172                  |
| 6.70 R 13 C                   | 5.00                           | 660                   | 180                  |
| 6.70 R 14 C                   | 5.00                           | 688                   | 180                  |
| 6.70 R 15 C                   | 5.00                           | 712                   | 180                  |
| 7.00 R 15 C                   | 5.50                           | 744                   | 195                  |
| <b>'Low section' series</b>   |                                |                       |                      |
| 6.50 R 14 C                   | 5.00                           | 640                   | 170                  |
| 7.00 R 14 C                   | 5.00                           | 650                   | 180                  |
| 7.50 R 14 C                   | 5.50                           | 686                   | 195                  |

### TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON 15° TAPERED RIMS (DROP-CENTRE)

| Tyre size designation | Measuring-rim width(in inches) | Outer diameter(in mm) | Section width(in mm) |
|-----------------------|--------------------------------|-----------------------|----------------------|
| 7 R 17.5 C            | 5.25                           | 752                   | 185                  |
| 8 R 17.5 C            | 6.00                           | 784                   | 208                  |

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

### TABLE 13

Commercial vehicle tyres

### DIAGONAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON 5° TAPERED RIMS (DROP CENTRE)

Rim diameter 12" — 15"

| Tyre size designation         | Measuring-rim width(in inches) | Outer diameter(in mm) | Section width(in mm) |
|-------------------------------|--------------------------------|-----------------------|----------------------|
| <b>'Super balloon' series</b> |                                |                       |                      |
| 5.20-12 C                     | 3.50                           | 560                   | 136                  |
| 5.60-12 C                     | 4.00                           | 572                   | 148                  |
| 5.60-13 C                     | 4.00                           | 598                   | 148                  |
| 5.90-13 C                     | 4.50                           | 616                   | 158                  |

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TABLE 13

## Commercial vehicle tyres

DIAGONAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON 5°  
TAPERED RIMS (DROP CENTRE)

## Rim diameter 12" — 15"

|                             |             |     |     |
|-----------------------------|-------------|-----|-----|
| 5.90-14 C                   | 4.50        | 642 | 158 |
| 5.90-15 C                   | 4.50        | 668 | 158 |
| 6.40-13 C                   | 5.00        | 640 | 172 |
| 6.40-14 C                   | 5.00        | 666 | 172 |
| 6.40-15 C                   | 5.00        | 692 | 172 |
| 6.40-16 C                   | 4.50        | 748 | 172 |
| 6.70-13 C                   | 5.00        | 662 | 180 |
| 6.70-14 C                   | 5.00        | 688 | 180 |
| 6.70-15 C                   | 5.00        | 714 | 180 |
| <b>'Low section' series</b> |             |     |     |
| 5.50-12 C                   | 4.00        | 552 | 142 |
| 6.00-12 C                   | 4.50        | 574 | 158 |
| 6.00-14 C                   | 4.50        | 626 | 158 |
| 6.50-14 C                   | 5.00        | 650 | 172 |
| 6.50-15 C                   | 5.00        | 676 | 172 |
| 7.00-14 C                   | 5.00        | 668 | 182 |
| 7.50-14 C                   | 5.50        | 692 | 192 |
| <b>'Balloon' series</b>     |             |     |     |
| 7.00-15 C                   | 5.50        | 752 | 198 |
| 7.50-15 C                   | 6.00        | 780 | 210 |
| <b>'Millimetric' series</b> |             |     |     |
| 125-12 C                    | 3.50        | 514 | 127 |
| 165-15 C                    | 4.50        | 652 | 167 |
| 185-14 C                    | 5.50        | 654 | 188 |
| 195-14 C                    | 5.50        | 670 | 198 |
| 245-16 C                    | 7.00        | 798 | 248 |
| 17-15 C or                  | 5.00        | 678 | 178 |
| 17-380 C                    | 5.00        | 678 | 178 |
| 17-400 C                    | 19 × 400 mm | 702 | 186 |
| 19-400 C                    | 19 × 400 mm | 736 | 200 |

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TABLE 13

## Commercial vehicle tyres

DIAGONAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON 5°  
TAPERED RIMS (DROP CENTRE)

Rim diameter 12" — 15"

|          |             |     |     |
|----------|-------------|-----|-----|
| 21-400 C | 19 × 400 mm | 772 | 216 |
|----------|-------------|-----|-----|

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 14

## Commercial vehicle tyres

RADIAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON 5°  
TAPERED RIMS (DROP-CENTRE) RIMS

'Millimetric' series

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 125 R 12 C                   | 3.50                                  | 510                          | 127                         |
| 125 R 13 C                   | 3.50                                  | 536                          | 127                         |
| 125 R 14 C                   | 3.00                                  | 562                          | 127                         |
| 125 R 15 C                   | 3.50                                  | 588                          | 127                         |
| 135 R 12 C                   | 4.00                                  | 522                          | 137                         |
| 135 R 13 C                   | 4.00                                  | 548                          | 137                         |
| 135 R 14 C                   | 4.00                                  | 574                          | 137                         |
| 135 R 15 C                   | 4.00                                  | 600                          | 137                         |
| 145 R 10 C                   | 4.00                                  | 492                          | 147                         |
| 145 R 12 C                   | 4.00                                  | 542                          | 147                         |
| 145 R 13 C                   | 4.00                                  | 566                          | 147                         |
| 145 R 14 C                   | 4.00                                  | 590                          | 147                         |
| 145 R 15 C                   | 4.00                                  | 616                          | 147                         |
| 155 R 12 C                   | 4.50                                  | 550                          | 157                         |
| 155 R 13 C                   | 4.50                                  | 578                          | 157                         |
| 155 R 14 C                   | 4.50                                  | 604                          | 157                         |
| 155 R 15 C                   | 4.50                                  | 630                          | 157                         |
| 155 R 16 C                   | 4.50                                  | 656                          | 157                         |
| 165 R 13 C                   | 4.50                                  | 596                          | 167                         |
| 165 R 14 C                   | 4.50                                  | 622                          | 167                         |



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TABLE 14

## Commercial vehicle tyres

RADIAL TYRES FOR LIGHT COMMERCIAL VEHICLES MOUNTED ON 5°  
TAPERED RIMS (DROP-CENTRE) RIMS

## 'Millimetric' series

|              |             |     |     |
|--------------|-------------|-----|-----|
| 165 R 15 C   | 4.50        | 646 | 167 |
| 165 R 16 C   | 4.50        | 672 | 167 |
| 175 R 13 C   | 5.00        | 608 | 178 |
| 175 R 14 C   | 5.00        | 634 | 178 |
| 175 R 15 C   | 5.00        | 660 | 178 |
| 175 R 16 C   | 5.00        | 684 | 178 |
| 185 R 13 C   | 5.50        | 624 | 188 |
| 185 R 14 C   | 5.50        | 650 | 188 |
| 185 R 15 C   | 5.50        | 674 | 188 |
| 185 R 16 C   | 5.50        | 700 | 188 |
| 195 R 14 C   | 5.50        | 666 | 198 |
| 195 R 15 C   | 5.50        | 690 | 198 |
| 195 R 16 C   | 5.50        | 716 | 198 |
| 205 R 14 C   | 6.00        | 686 | 208 |
| 205 R 15 C   | 6.00        | 710 | 208 |
| 205 R 16 C   | 6.00        | 736 | 208 |
| 215 R 14 C   | 6.00        | 700 | 218 |
| 215 R 15 C   | 6.00        | 724 | 218 |
| 215 R 16 C   | 6.00        | 750 | 218 |
| 225 R 14 C   | 6.50        | 714 | 228 |
| 225 R 15 C   | 6.50        | 738 | 228 |
| 225 R 16 C   | 6.50        | 764 | 228 |
| 235 R 14 C   | 6.50        | 728 | 238 |
| 235 R 15 C   | 6.50        | 752 | 238 |
| 235 R 16 C   | 6.50        | 778 | 238 |
| 17 R 15 C or | 5.00        | 678 | 178 |
| 17 R 380 C   | 5.00        | 678 | 178 |
| 17 R 400 C   | 19 × 400 mm | 698 | 186 |
| 19 R 400 C   | 19 × 400 mm | 728 | 200 |

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TABLE 15

Commercial vehicle tyres

DIAGONAL WIDE-BASE TYRES FOR MULTIPURPOSE TRUCKS ON HIGHWAY, OFF-THE-ROAD AND AGRICULTURAL SERVICES

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 10.5-18 MPT                  | 9                                     | 905                          | 270                         |
| 10.5-20 MPT                  | 9                                     | 955                          | 270                         |
| 12.5-18 MPT                  | 11                                    | 990                          | 325                         |
| 12.5-20 MPT                  | 11                                    | 1 040                        | 325                         |
| 14.5-20 MPT                  | 11                                    | 1 095                        | 355                         |
| 14.5-24 MPT                  | 11                                    | 1 195                        | 355                         |
| 7.50-18 MPT                  | 5.50                                  | 885                          | 208                         |

TABLE 16

RADIAL WIDE-BASE TYRES FOR MULTIPURPOSE TRUCKS ON HIGHWAY, OFF-THE-ROAD AND AGRICULTURAL SERVICES

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 10.5 R 20 MPT                | 9                                     | 955                          | 276                         |
| 12.5 R 20 MPT                | 11                                    | 1 040                        | 330                         |
| 14.5 R 20 MPT                | 11                                    | 1 095                        | 362                         |
| 14.5 R 24 MPT                | 11                                    | 1 195                        | 362                         |

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 17

Commercial vehicle tyres

RADIAL 'FREE-ROLLING' TYRES IN HIGHWAY SERVICE

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 5.00 R 8                     | 3.00                                  | 467                          | 132                         |
| 6.00 R 9                     | 4.00                                  | 540                          | 160                         |
| 7.00 R 12                    | 5.00                                  | 672                          | 192                         |
| 7.50 R 15                    | 6.00                                  | 772                          | 212                         |
| 8.25 R 15                    | 6.50                                  | 836                          | 234                         |
| 10.00 R 15                   | 7.50                                  | 918                          | 275                         |

## ANNEX II

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TABLE 18

## DIAGONAL 'FREE-ROLLING' TYRES IN HIGHWAY SERVICE

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 6.00-9                       | 4.00                                  | 540                          | 160                         |
| 7.00-12                      | 5.00                                  | 672                          | 192                         |
| 7.00-15                      | 5.00                                  | 746                          | 192                         |
| 7.50-15                      | 6.00                                  | 772                          | 212                         |
| 8.25-15                      | 6.50                                  | 836                          | 234                         |
| 10.00-15                     | 7.50                                  | 918                          | 275                         |
| 200-15                       | 6.50                                  | 730                          | 205                         |

TABLE 19

## DIAGONAL '75' SERIES MOUNTED ON 15° TAPERED RIMS

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 7.25/75-16.5 or<br>7.25-16.5 | 5.25                                  | 695                          | 182                         |
| 8.00/75-16.5 or<br>8.00-16.5 | 6.00                                  | 724                          | 203                         |
| 8.75/75-16.5 or<br>8.75-16.5 | 6.75                                  | 752                          | 224                         |
| 9.50/75-16.5 or<br>9.50-16.5 | 7.50                                  | 781                          | 245                         |

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 20

## Commercial vehicle tyres

## DIAGONAL

## DIAGONAL AND RADIAL TYRES MOUNTED ON FLAT BASE OR DIVIDED RIMS

| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 3.00-4                       | 2.10                                  | 255                          | 81                          |
| 4.00-4                       | 2.50                                  | 312                          | 107                         |
| 4.00-8                       | 2.50                                  | 414                          | 107                         |
| 5.00-8                       | 3.00                                  | 467                          | 132                         |
| 6.50-10                      | 5.00                                  | 588                          | 177                         |

**a** Also marked 18 × 7.

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**DIAGONAL**


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**DIAGONAL AND RADIAL TYRES MOUNTED ON FLAT BASE OR DIVIDED RIMS**


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|                       |       |       |     |
|-----------------------|-------|-------|-----|
| 7.00-9                | 5.00  | 562   | 174 |
| 7.50-10               | 5.50  | 645   | 207 |
| 8.25-10               | 6.50  | 698   | 240 |
| 10.50-13              | 6.00  | 889   | 275 |
| 10.50-16              | 6.00  | 965   | 275 |
| 11.00-16              | 6.00  | 952   | 272 |
| 14.00-16              | 10.00 | 1 139 | 375 |
| 15 × 4.5-2            | 3.25  | 385   | 122 |
| 16 × 6-8              | 4.33  | 425   | 152 |
| 18 × 7-8 <sup>a</sup> | 4.33  | 462   | 173 |
| 21 × 4                | 2.32  | 565   | 113 |
| 21 × 8-9              | 6.00  | 535   | 200 |
| 23 × 9-10             | 6.50  | 595   | 225 |
| 22 × 4.5              | 3.11  | 595   | 132 |
| 23 × 5                | 3.75  | 635   | 155 |
| 25 × 6                | 3.75  | 680   | 170 |
| 27 × 6                | 4.33  | 758   | 188 |
| 27 × 10-12            | 8.00  | 690   | 255 |
| 28 × 6                | 3.75  | 760   | 170 |
| 28 × 9-15             | 7.00  | 707   | 216 |
| (8.15-15)             | 7.00  | 707   | 216 |
| 29 × 7                | 5.00  | 809   | 211 |
| 29 × 8                | 6.00  | 809   | 243 |
| 9.00-15               | 6.00  | 840   | 249 |
| 2.50-15               | 7.50  | 735   | 250 |
| 3.00-15               | 8.00  | 840   | 300 |

<sup>a</sup> Also marked 18 × 7.

**RADIAL**


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| <b>Tyre size designation</b> | <b>Measuring-rim width(in inches)</b> | <b>Outer diameter(in mm)</b> | <b>Section width(in mm)</b> |
|------------------------------|---------------------------------------|------------------------------|-----------------------------|
| 6.50 R 10                    | 5.00                                  | 588                          | 177                         |
| 7.00 R 15                    | 5.50                                  | 746                          | 197                         |
| 7.50 R 10                    | 5.50                                  | 645                          | 207                         |

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| RADIAL         |      |     |     |
|----------------|------|-----|-----|
| 15 × 4.5 R 8   | 3.25 | 385 | 122 |
| 16 × 6 R 8     | 4.33 | 425 | 152 |
| 18 × 7 R 8     | 4.33 | 462 | 173 |
| 560 × 165 R 11 | 5.00 | 560 | 175 |
| 680 × 180 R 15 | 5.00 | 680 | 189 |

*Tolerances:* see sections 6.1.4 and 6.1.5 of Annex II.

TABLE 21

Tyres for trucks, buses, trailers and multipurpose passenger vehicles in normal highway service

DIAGONAL AND RADIAL TYRES MOUNTED ON 5° DROP-CENTRE OR SEMI-DROP-CENTRE RIMS

| Tyre size designation |              | Measuring-rim width(in inches) | Section width(in mm) <sup>a</sup> | Outer diameter                    |                                  |
|-----------------------|--------------|--------------------------------|-----------------------------------|-----------------------------------|----------------------------------|
| Diagonal              | Radial       |                                |                                   | Highway tread(in mm) <sup>b</sup> | Mud and snow(in mm) <sup>b</sup> |
| 6.00-16 LT            | 6.00 R 16 LT | 4.50                           | 173                               | 732                               | 743                              |
| 6.50-16 LT            | 6.50 R 16 LT | 4.50                           | 182                               | 755                               | 767                              |
| 6.70-15 LT            | 6.70 R 15 LT | 5.00                           | 191                               | 722                               | 733                              |
| 7.00-13 LT            | 7.00 R 13 LT | 5.00                           | 187                               | 647                               | 658                              |
| 7.00-14 LT            | 7.00 R 14 LT | 5.00                           | 187                               | 670                               | 681                              |
| 7.00-15 LT            | 7.00 R 15 LT | 5.50                           | 202                               | 752                               | 763                              |
| 7.00-16 LT            | 7.00 R 16 LT | 5.50                           | 202                               | 778                               | 788                              |
| 7.10-15 LT            | 7.10 R 15 LT | 5.00                           | 199                               | 738                               | 749                              |
| 7.50-15 LT            | 7.50 R 15 LT | 6.00                           | 220                               | 782                               | 794                              |
| 7.50-16 LT            | 7.50 R 16 LT | 6.00                           | 220                               | 808                               | 819                              |
| 8.25-16 LT            | 8.25 R 16 LT | 6.50                           | 241                               | 859                               | 869                              |
| 9.00-16 LT            | 9.00 R 16 LT | 6.50                           | 257                               | 890                               | 903                              |
| D78-14 LT             | DR 78-14 LT  | 5.00                           | 192                               | 661                               | 672                              |
| E78-14 LT             | ER 78-14 LT  | 5.50                           | 199                               | 667                               | 678                              |
| C78-15 LT             | CR 78-15 LT  | 5.00                           | 187                               | 672                               | 683                              |
| G78-15 LT             | GR 78-15 LT  | 6.00                           | 212                               | 711                               | 722                              |
| H78-15 LT             | HR 78-15 LT  | 6.00                           | 222                               | 727                               | 739                              |

**a** Overall tyre widths may exceed the above section widths by 8 %.

**b** Tolerance + 8 % of the difference between the above outer diameter and the nominal rim diameters.

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TABLE 21

Tyres for trucks, buses, trailers and multipurpose passenger vehicles in normal highway service

DIAGONAL AND RADIAL TYRES MOUNTED ON 5° DROP-CENTRE OR SEMI-DROP-CENTRE RIMS

|           |             |      |     |     |     |
|-----------|-------------|------|-----|-----|-----|
| L78-15 LT | LR 78-15 LT | 6.50 | 236 | 749 | 760 |
| F78-16 LT | FR 78-16 LT | 5.50 | 202 | 721 | 732 |
| H78-16 LT | HR 78-16 LT | 6.00 | 222 | 753 | 764 |
| L78-16 LT | LR 78-16 LT | 6.50 | 236 | 775 | 786 |

**a** Overall tyre widths may exceed the above section widths by 8 %.

**b** Tolerance + 8 % of the difference between the above outer diameter and the nominal rim diameters.

TABLE 22

Tyres for trucks, buses, trailers and multipurpose passenger vehicles in normal highway service

DIAGONAL AND RADIAL TYRES MOUNTED ON 15° DROP-CENTRE RIMS

TABLE 22.1

| Tyre size designation |             | Measuring-rim width(inches) | Section width(mm) <sup>a</sup> | Outer diameter                 |                               |
|-----------------------|-------------|-----------------------------|--------------------------------|--------------------------------|-------------------------------|
| Diagonal              | Radial      |                             |                                | Highway tread(mm) <sup>b</sup> | Mud and snow(mm) <sup>b</sup> |
| 7-14.5 LT             | —           | 6.00                        | 185                            | 677                            | —                             |
| 8-14.5 LT             | —           | 6.00                        | 203                            | 707                            | —                             |
| 9-14.5 LT             | —           | 7.00                        | 241                            | 711                            | —                             |
| 7-17.5 LT             | 7 R 17.5 LT | 5.25                        | 189                            | 758                            | 769                           |
| 8-17.5 LT             | 8 R 17.5 LT | 5.25                        | 199                            | 788                            | 799                           |

**a** Overall tyre widths may exceed the above section widths by 8 %.

**b** Tolerance + 8 % of the difference between the above outer diameters and the nominal rim diameters.

TABLE 22.2

| Tyre size designation |                | Measuring-rim width(inches) | Section width(mm) <sup>a</sup> | Outer diameter                 |                               |
|-----------------------|----------------|-----------------------------|--------------------------------|--------------------------------|-------------------------------|
| Diagonal              | Radial         |                             |                                | Highway tread(mm) <sup>b</sup> | Mud and snow(mm) <sup>b</sup> |
| 8.00-16.5 LT          | 8.00 R 16.5 LT | 6.00                        | 203                            | 720                            | 730                           |
| 8.75-16.5 LT          | 8.75 R 16.5 LT | 6.75                        | 222                            | 748                            | 759                           |
| 9.50-16.5 LT          | 9.50 R 16.5 LT | 6.75                        | 241                            | 776                            | 787                           |
| 10-16.5 LT            | 10 R 16.5 LT   | 8.25                        | 264                            | 762                            | 773                           |

**a** Overall tyre widths may exceed the above section widths by 7 %.

**b** Tolerance + 8 % of the difference between the above outer diameter and the nominal rim diameters.

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TABLE 22.2

|                    |                      |       |     |     |     |
|--------------------|----------------------|-------|-----|-----|-----|
| 10-17.5 LT         | 10 R 17.5 LT         | 8.25  | 264 | 787 | 798 |
| 12-16.5 LT         | 12 R 16.5 LT         | 9.75  | 307 | 818 | 831 |
| 30 × 9.50-16.5 LT  | 30 × 9.50 R 16.5 LT  | 7.50  | 240 | 750 | 761 |
| 31 × 10.50-16.5 LT | 31 × 10.50 R 16.5 LT | 8.25  | 266 | 775 | 787 |
| 33 × 10.50-16.5 LT | 33 × 12.50 R 16.5 LT | 9.75  | 315 | 826 | 838 |
| 37 × 10.50-16.5 LT | 37 × 14.50 R 16.5 LT | 11.25 | 365 | 928 | 939 |

**a** Overall tyre widths may exceed the above section widths by 7 %.

**b** Tolerance + 8 % of the difference between the above outer diameter and the nominal rim diameters.

TABLE 23

Tyres for trucks, buses, trailers in normal highway service

DIAGONAL AND RADIAL TYRES MOUNTED ON 15° DROP-CENTRE RIMS

| Tyre size designation       |             | Measuring-<br>rim<br>width(inches) | Section<br>width(mm) <sup>a</sup> | Outer diameter                    |                                 |                                  |
|-----------------------------|-------------|------------------------------------|-----------------------------------|-----------------------------------|---------------------------------|----------------------------------|
| Diagonal                    | Radial      |                                    |                                   | Highway<br>tread(mm) <sup>b</sup> | Heavy<br>tread(mm) <sup>b</sup> | Mud and<br>snow(mm) <sup>b</sup> |
| <b>Normal-section tyres</b> |             |                                    |                                   |                                   |                                 |                                  |
| 7-22.5                      | 7 R 22.5    | 5.25                               | 178                               | 878                               | —                               | 894                              |
| 8-19.5                      | 8 R 19.5    | 6.00                               | 203                               | 859                               | —                               | 876                              |
| 8-22.5                      | 8 R 22.5    | 6.00                               | 203                               | 935                               | —                               | 952                              |
| 9-22.5                      | 9 R 22.5    | 6.75                               | 229                               | 974                               | 982                             | 992                              |
| 10-22.5                     | 10 R 22.5   | 7.50                               | 254                               | 1 019                             | 1 031                           | 1 038                            |
| 11-22.5                     | 11 R 22.5   | 8.25                               | 279                               | 1 054                             | 1 067                           | 1 037                            |
| 11-24.5                     | 11 R 24.5   | 8.25                               | 279                               | 1 104                             | 1 118                           | 1 123                            |
| 12-22.5                     | 12 R 22.5   | 9.00                               | 300                               | 1 085                             | 1 099                           | 1 104                            |
| 12-24.5                     | 12 R 24.5   | 9.00                               | 300                               | 1 135                             | 1 150                           | 1 155                            |
| 12.5-22.5                   | 12.5 R 22.5 | 9.00                               | 302                               | 1 085                             | 1 099                           | 1 104                            |
| 12.5-22.5                   | 12.5 R 24.5 | 9.00                               | 302                               | 1 135                             | 1 150                           | 1 155                            |
| <b>Wide-base tyres</b>      |             |                                    |                                   |                                   |                                 |                                  |
| 14-17.5                     | 14 R 17.5   | 10.50                              | 349                               | 907                               | —                               | 921                              |
| 15-19.5                     | 15 R 19.5   | 11.75                              | 389                               | 1 005                             | —                               | 1 019                            |
| 15-22.5                     | 15 R 22.5   | 11.75                              | 389                               | 1 082                             | —                               | 1 095                            |

**a** Overall tyre widths may exceed the above section widths by 6 %.

**b** Tolerance + 5 % of the difference between the above outer diameter and the nominal rim diameters.

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TABLE 23

Tyres for trucks, buses, trailers in normal highway service

## DIAGONAL AND RADIAL TYRES MOUNTED ON 15° DROP-CENTRE RIMS

|           |             |       |     |       |   |       |
|-----------|-------------|-------|-----|-------|---|-------|
| 16.5-19.5 | 16.5 R 19.5 | 13.00 | 425 | 1 052 | — | 1 068 |
| 16.5-22.5 | 16.5 R 22.5 | 13.00 | 425 | 1 128 | — | 1 144 |
| 18-19.5   | 18 R 19.5   | 14.00 | 457 | 1 080 | — | 1 096 |
| 18-22.5   | 18 R 22.5   | 14.00 | 457 | 1 158 | — | 1 172 |
| 19.5-19.5 | 19.5 R 19.5 | 15.00 | 495 | 1 138 | — | 1 156 |

**a** Overall tyre widths may exceed the above section widths by 6 %.

**b** Tolerance + 5 % of the difference between the above outer diameter and the nominal rim diameters.

TABLE 24

Tyres for trucks, buses, trailers in normal highway service

## DIAGONAL AND RADIAL TYRES MOUNTED ON 5° DROP-CENTRE RIMS

| Tyre size designation |               | Measuring-rim width(inches) | Section width(mm) <sup>a</sup> | Outer diameter                 |                              |                               |
|-----------------------|---------------|-----------------------------|--------------------------------|--------------------------------|------------------------------|-------------------------------|
| Diagonal              | Radial        |                             |                                | Highway tread(mm) <sup>b</sup> | Heavy tread(mm) <sup>b</sup> | Mud and snow(mm) <sup>b</sup> |
| —                     | 8R14LT        | 7.00                        | 216                            | 667                            | —                            | —                             |
| 9-15LT                | —             | 8.00                        | 254                            | 744                            | 755                          | —                             |
| 10-15LT               | 10R15LT       | 8.00                        | 264                            | 773                            | 783                          | —                             |
| 10-16LT               | —             | 8.00                        | 264                            | 798                            | 809                          | —                             |
| 11-14LT               | —             | 8.00                        | 279                            | 752                            | 763                          | —                             |
| 11-15LT               | 11R15LT       | 8.00                        | 279                            | 777                            | 788                          | —                             |
| 11-16LT               | —             | 8.00                        | 279                            | 803                            | 813                          | —                             |
| 12-15LT               | —             | 10.00                       | 318                            | 823                            | 834                          | —                             |
| —                     | 9R15LT        | 8.00                        | 254                            | 744                            | 755                          | 752                           |
| 24 × 7.50-13          | 24 × 7.50R13  | 7.00                        | 191                            | 597                            | 609                          | 604                           |
| 27 × 8.50-14          | 27 × 8.50-14  | 7.00                        | 218                            | 674                            | 685                          | 680                           |
| 28 × 8.50-15          | 28 × 8.50-15  | 7.00                        | 218                            | 699                            | 711                          | 705                           |
| 29 × 9.50-15          | 29 × 9.50-15  | 7.50                        | 240                            | 724                            | 736                          | 731                           |
| 30 × 9.50-15          | 30 × 9.50-15  | 7.50                        | 240                            | 750                            | 761                          | 756                           |
| 31 × 10.50-15         | 31 × 10.50-15 | 8.50                        | 268                            | 775                            | 787                          | 781                           |
| 31 × 11.50-15         | 31 × 11.50-15 | 9.00                        | 290                            | 775                            | 787                          | 781                           |
| 32 × 11.50-15         | 32 × 11.50-15 | 9.00                        | 290                            | 801                            | 812                          | 807                           |

**a** Overall tyre widths may exceed the above section widths by 6 %.

**b** Tolerance + 6 % of the difference between the above outer diameter and the nominal rim diameters.



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TABLE 24

Tyres for trucks, buses, trailers in normal highway service

## DIAGONAL AND RADIAL TYRES MOUNTED ON 5° DROP-CENTRE RIMS

|               |                |        |     |     |     |     |
|---------------|----------------|--------|-----|-----|-----|-----|
| 33 × 12.50-15 | 531 × 12.50-15 | 510T00 | 318 | 826 | 838 | 832 |
| 35 × 12.50-15 | 551 × 12.50-15 | 510T00 | 318 | 877 | 888 | 883 |
| 37 × 12.50-15 | 571 × 12.50-15 | 510T00 | 318 | 928 | 939 | 934 |
| 31 × 13.50-15 | 511 × 13.50-15 | 511T00 | 345 | 775 | 787 | 781 |
| 37 × 14.50-15 | 571 × 14.50-15 | 512T00 | 372 | 928 | 939 | 934 |
| 31 × 15.50-15 | 511 × 15.50-15 | 512T00 | 390 | 775 | 787 | 781 |

**a** Overall tyre widths may exceed the above section widths by 6 %.

**b** Tolerance + 6 % of the difference between the above outer diameter and the nominal rim diameters.

TABLE 25

Tyres for trucks, buses and trailers in normal highway service

## DIAGONAL AND RADIAL TYRES MOUNTED ON MULTI-PIECE BYMS

| Tyre size designation |            | Measuring-<br>rim<br>width(inches) | Section<br>width(mm) <sup>a</sup> | Outer diameter                    |                                 |                                  |
|-----------------------|------------|------------------------------------|-----------------------------------|-----------------------------------|---------------------------------|----------------------------------|
| Diagonal              | Radial     |                                    |                                   | Highway<br>tread(mm) <sup>b</sup> | Heavy<br>tread(mm) <sup>b</sup> | Mud and<br>snow(mm) <sup>b</sup> |
| 6.50-20               | 6.50R20    | 5.00                               | 184                               | 878                               | —                               | 1 049                            |
| 7.00-15TR             | 7.00R15TR  | 5.50                               | 199                               | 777                               | —                               | 962                              |
| 7.00-17               | 7.00R17    | 5.50                               | 199                               | 828                               | —                               | 843                              |
| 7.00-18               | 7.00R18    | 5.50                               | 199                               | 853                               | —                               | 868                              |
| 7.00-20               | 7.00R20    | 5.50                               | 199                               | 904                               | —                               | 919                              |
| 7.50-15TR             | 7.50R15TR  | 6.00                               | 215                               | 808                               | —                               | 825                              |
| 7.50-17               | 7.50R17    | 6.00                               | 215                               | 859                               | —                               | 876                              |
| 7.50-18               | 7.50R18    | 6.00                               | 215                               | 884                               | —                               | 981                              |
| 7.50-20               | 7.50R20    | 6.00                               | 215                               | 935                               | —                               | 952                              |
| 8.25-15TR             | 8.25R15TR  | 6.50                               | 236                               | 847                               | 855                             | 865                              |
| 8.25-17               | 8.25R17    | 6.50                               | 236                               | 898                               | 906                             | 915                              |
| 8.25-20               | 8.25R20    | 6.50                               | 236                               | 974                               | 982                             | 992                              |
| 9.00-15TR             | 9.00R15TR  | 7.00                               | 259                               | 891                               | 904                             | 911                              |
| 9.00-20               | 9.00R20    | 7.00                               | 259                               | 1 019                             | 1 031                           | 1 038                            |
| 10.00-15TR            | 10.00R15TR | 7.50                               | 278                               | 927                               | 940                             | 946                              |
| 10.00-20              | 10.00R20   | 7.50                               | 278                               | 1 054                             | 1 067                           | 1 073                            |

**a** Overall tyre widths may exceed the above section widths by 6 %.

**b** Tolerance + 6 % of the difference between the above outer diameter and the nominal rim diameters.

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TABLE 25

Tyres for trucks, buses and trailers in normal highway service

## DIAGONAL AND RADIAL TYRES MOUNTED ON MULTI-PIECE BYMS

|            |            |      |     |       |       |       |
|------------|------------|------|-----|-------|-------|-------|
| 10.00-22   | 10.50R22   | 7.50 | 278 | 1 104 | 1 118 | 1 123 |
| 11.00-15TR | 11.00R15TR | 8.00 | 293 | 958   | 972   | 977   |
| 11.00-20   | 11.00R20   | 8.00 | 293 | 1 085 | 1 099 | 1 104 |
| 11.00-22   | 11.00R22   | 8.00 | 293 | 1 135 | 1 150 | 1 155 |
| 11.00-24   | 11.00R24   | 8.00 | 293 | 1 186 | 1 201 | 1 206 |
| 11.50-20   | 11.50R20   | 8.00 | 296 | 1 085 | 1 099 | 1 104 |
| 11.50-22   | 11.50R22   | 8.00 | 296 | 1 135 | 1 150 | 1 155 |
| 12.50-20   | 12.00R20   | 8.50 | 315 | 1 125 | —     | 1 146 |
| 12.50-24   | 12.00R24   | 8.50 | 315 | 1 226 | —     | 1 247 |

**a** Overall tyre widths may exceed the above section widths by 6 %.

**b** Tolerance + 6 % of the difference between the above outer diameter and the nominal rim diameters.

TABLE 26

Tyres for trucks and trailers in highway service at restricted speeds

## DIAGONAL AND RADIAL TYRES MOUNTED ON MULTI-PIECE RIMS

| Tyre size designation |          | Measuring-rim width(inches) | Section width(mm) <sup>a</sup> | Outer diameter                 |                               |
|-----------------------|----------|-----------------------------|--------------------------------|--------------------------------|-------------------------------|
| Diagonal              | Radial   |                             |                                | Highway tread(mm) <sup>b</sup> | Mud and snow(mm) <sup>b</sup> |
| 13.00-20              | 13.00R20 | 9.00                        | 340                            | 1 177                          | 1 200                         |
| 14.00-20              | 14.00R20 | 10.00                       | 375                            | 1 241                          | 1 266                         |
| 14.00-24              | 14.00R24 | 10.00                       | 375                            | 1 343                          | 1 368                         |

**a** Overall tyre widths may exceed the above section widths by 6 %.

**b** Tolerance + 6 % of the difference between the above outer diameter and the nominal rim diameters.

TABLE 27

Tyres for mobile homes in highway service

## DIAGONAL

| Tyre size designation                        | Measuring-rim width(inches) | Section width(mm) <sup>a</sup> | Outer diameter(mm) <sup>b</sup> |
|--|-----------------------------|--------------------------------|---------------------------------|
| <b>Tyres mounted on 15° drop-centre rims</b> |                             |                                |                                 |
| 7-14.5 MH                                    | 6.00                        | 185                            | 677                             |
| 8-14.5 MH                                    | 6.00                        | 203                            | 707                             |

**a** Overall tyre widths may exceed the above section widths by 8 %.

**b** Tolerance + 8 % of the difference between the above outer diameter and the nominal rim diameters.

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TABLE 27

Tyres for mobile homes in highway service

DIAGONAL

|           |      |     |     |
|-----------|------|-----|-----|
| 9-14.5 MH | 7.00 | 241 | 711 |
|-----------|------|-----|-----|

**Tyres mounted on 5° drop-centre and semi-drop-centre rims**

|            |      |     |     |
|------------|------|-----|-----|
| 7.00-15 MH | 5.50 | 202 | 752 |
|------------|------|-----|-----|

**a** Overall tyre widths may exceed the above section widths by 8 %.

**b** Tolerance + 8 % of the difference between the above outer diameter and the nominal rim diameters.

TABLE 28

Mining and logging tyres in intermittent highway service

DIAGONAL

| Tyre size designation | Measuring-rim width(inches) | Section width(mm) <sup>a</sup> | Outer diameter                  |                              |
|-----------------------|-----------------------------|--------------------------------|---------------------------------|------------------------------|
|                       |                             |                                | Traction tread(mm) <sup>b</sup> | Extra tread(mm) <sup>b</sup> |

**Tyres mounted on 15° drop-centre rims**

|             |       |     |       |       |
|-------------|-------|-----|-------|-------|
| 7.00-20 ML  | 5.50  | 199 | 919   | —     |
| 7.50-20 ML  | 6.00  | 215 | 952   | —     |
| 8.25-20 ML  | 6.50  | 236 | 992   | —     |
| 9.00-20 ML  | 7.00  | 259 | 1 038 | 1 063 |
| 10.00-20 ML | 7.50  | 278 | 1 073 | 1 099 |
| 10.00-22 ML | 7.50  | 278 | 1 123 | 1 150 |
| 10.00-20 ML | 7.50  | 278 | 1 174 | 1 200 |
| 11.00-20 ML | 8.00  | 293 | 1 104 | 1 131 |
| 11.00-22 ML | 8.00  | 293 | 1 155 | 1 182 |
| 11.00-24 ML | 8.00  | 293 | 1 206 | 1 233 |
| 12.00-20 ML | 8.50  | 315 | 1 146 | 1 173 |
| 12.00-24 ML | 8.50  | 315 | 1 247 | 1 275 |
| 13.00-20 ML | 9.00  | 340 | 1 200 | —     |
| 13.00-24 ML | 9.00  | 340 | 1 302 | —     |
| 14.00-20 ML | 10.00 | 375 | 1 266 | —     |
| 14.00-24 ML | 10.00 | 375 | 1 368 | —     |

**Tyres mounted on full-tapered bead seat rims**

|             |      |     |       |       |
|-------------|------|-----|-------|-------|
| 11.00-25 ML | 8.50 | 298 | 1 206 | 1 233 |
|-------------|------|-----|-------|-------|

**a** Overall tyre widths may exceed the above section widths by 8 %.

**b** Tolerance + 6 % of the difference between the above outer diameter and the nominal rim diameters.

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TABLE 28

## Mining and logging tyres in intermittent highway service

## DIAGONAL

|             |       |     |       |       |
|-------------|-------|-----|-------|-------|
| 12.00-21 ML | 8.50  | 315 | 1 146 | 1 175 |
| 12.00-25 ML | 8.50  | 315 | 1 247 | 1 275 |
| 13.00-25 ML | 10.00 | 351 | 1 302 | —     |
| 14.00-21 ML | 10.00 | 375 | 1 266 | —     |
| 14.00-25 ML | 10.00 | 375 | 1 368 | —     |

**Tyres mounted on 15° drop-centre rims**

|            |      |     |       |   |
|------------|------|-----|-------|---|
| 9-22.5 ML  | 6.75 | 229 | 992   | — |
| 10-22.5 ML | 7.50 | 254 | 1 038 | — |
| 11-22.5 ML | 8.25 | 279 | 1 073 | — |
| 11-24.5 ML | 8.25 | 279 | 1 123 | — |
| 12-22.5 ML | 9.00 | 300 | 1 104 | — |

**Tyres mounted on 15° drop-centre rims**

|              |       |     |       |   |
|--------------|-------|-----|-------|---|
| 14-17.5 ML   | 10.50 | 349 | 921   | — |
| 15-19.5 ML   | 11.75 | 389 | 1 019 | — |
| 15-22.5 ML   | 11.75 | 389 | 1 095 | — |
| 16.5-19.5 ML | 13.00 | 425 | 1 068 | — |
| 16.5-22.5 ML | 13.00 | 425 | 1 144 | — |
| 18-19.5 ML   | 14.00 | 457 | 1 096 | — |
| 18-22.5 ML   | 14.00 | 457 | 1 172 | — |
| 19.5-19.5 ML | 15.00 | 495 | 1 156 | — |
| 23-23.5 ML   | 17.00 | 584 | 1 320 | — |

**a** Overall tyre widths may exceed the above section widths by 8 %.

**b** Tolerance + 6 % of the difference between the above outer diameter and the nominal rim diameters.

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## Appendix 6

### METHOD OF MEASURING TYRE DIMENSIONS

(see Annex II section 6.1.3)

#### PART A: PASSENGER CAR TYRES

- 1.1. The tyre is mounted on the measuring rim specified by the manufacturer pursuant to section 6.11 of Annex I, Appendix 1.
- 1.2. The pressure in the tyre is then adjusted as follows:
  - 1.2.1. in standard bias — belted tyres to 1,7 bar;
  - 1.2.2. in diagonal (bias-ply) tyres to the pressure shown below (bar):

| Ply-rating | Speed category |            |            |
|------------|----------------|------------|------------|
|            | L, M, N        | P, Q, R, S | T, U, H, V |
| 4          | 1,7            | 2,0        | —          |
| 6          | 2,1            | 2,4        | 2,6        |
| 8          | 2,5            | 2,8        | 3,0        |

- 1.2.3. in standard radial tyres to 1,8 bar,
  - 1.2.4. in reinforced tyres to 2,3 bar, and
  - 1.2.5. in T-type temporary-use spare tyres: to 4,2 bar.
2. The tyre, mounted on its rim, is conditioned at the ambient room temperature for not less than 24 hours, with the exception referred to in section 6.2.3 of Annex II.
3. The pressure is readjusted to that specified in section 1.2.
4. The overall width is measured by caliper at six equally-spaced points, account being taken of the thickness of the protective ribs or bands. The highest measurement so obtained is taken as the overall width.
5. The outer diameter is determined by measuring the maximum circumference and dividing the figure so obtained by  $\pi$  (3,1416).

#### PART B: COMMERCIAL VEHICLE TYRES

1. The tyre is mounted on the measuring rim specified by the manufacturer pursuant to section 6.11 of Appendix 1 to Annex I and is inflated to a pressure specified by the manufacturer pursuant to section 6.12 of Annex I, Appendix 1.
2. The tyre fitted on its rim is conditioned to the ambient temperature of the laboratory for at least 24 hours.
3. The pressure is readjusted to the value specified in section 1.

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4. The overall width is measured by caliper at six equally-spaced points, account being taken of the thickness of the protective ribs or bands. The highest measurement so obtained is taken as the overall width.
5. The outer diameter is determined by measuring the maximum circumference and dividing the figure so obtained by  $\pi$  (3,1416).

## Appendix 7

### LOAD/SPEED TEST-PROCEDURE<sup>(6)</sup>

(see Annex II, section 6.2)

#### PART A: PASSENGER CAR TYRES

1. Preparing the tyre
  - 1.1. A new tyre is mounted on the test rim specified by the manufacturer pursuant to section 6.11 of Annex I, Appendix 1.
  - 1.2. It is inflated to the appropriate pressure as given in the table below:

| Test pressure (bar) |                           |     |     |              |            |                   |
|---------------------|---------------------------|-----|-----|--------------|------------|-------------------|
| Speed category      | Diagonal (bias-ply) tyres |     |     | Radial tyres |            | Bias-belted tyres |
|                     | Ply-rating                |     |     | Standard     | Reinforced | Standard          |
|                     | 4                         | 6   | 8   |              |            |                   |
| L, M, N             | 2,3                       | 2,7 | 3,0 | 2,4          | —          | —                 |
| P, Q, R, S          | 2,6                       | 3,0 | 3,3 | 2,6          | 3,0        | 2,6               |
| T, U, H             | 2,8                       | 3,2 | 3,5 | 2,8          | 3,2        | 2,8               |
| V                   | 3,0                       | 3,4 | 3,7 | 3,0          | —          | —                 |

T-type temporary use spare tyres: to 4,2 bars.

- 1.3. The manufacturer may request, giving reasons, the use of an inflation pressure differing from those under section 1.2. In such a case the tyre is inflated to that pressure (see section 6.14 of Appendix 1 to Annex I).
- 1.4. The tyre-and-wheel assembly is conditioned at test-room temperature for not less than three hours.
- 1.5. The tyre pressure is readjusted to that specified in section 1.2 or 1.3.
2. Carrying out the test
  - 2.1. The tyre-and-wheel assembly is mounted on a test axle and pressed against the outer face of a smooth wheel 1,70 m  $\pm$  1 % or 2 m  $\pm$  1 % in diameter.
  - 2.2. Apply to the test axle a load equal to 80 % of:
    - 2.2.1. the maximum load rating equated to the load capacity index for tyres with speed symbols L to H inclusive:
    - 2.2.2. the maximum load rating associated with a maximum speed of 240 km/h for tyres with speed symbol 'V' (see section 2.31.2 of Annex II).

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- 2.3. Throughout the test the tyre pressure must not be corrected and the test load must be kept constant.
- 2.4. During the test the temperature in the test-room must be maintained at between 20 °C and 30 °C or at a higher temperature if the manufacturer agrees.
- 2.5. The test is carried out without interruption in conformity with the following particulars:
  - 2.5.1. time taken to pass from zero speed to initial test speed: 10 minutes;
  - 2.5.2. initial test speed: prescribed maximum speed for the type of tyre, less 40 km/h in the case of the smooth wheel having  $1,70 \text{ m} \pm 1 \%$  in diameter or less 30 km/h in the case of the smooth wheel having  $2 \text{ m} \pm 1 \%$  in diameter;
  - 2.5.3. successive speed increments: 10 km/h;
  - 2.5.4. duration of test at each speed step except the last: 10 minutes;
  - 2.5.5. duration of test at last speed step: 20 minutes;
  - 2.5.6. maximum test speed: prescribed maximum speed for the type of tyre, less 10 km/h in the case of the smooth wheel having  $1,7 \text{ m} \pm 1 \%$  in diameter or equal to prescribed maximum speed in the case of the smooth wheel having  $2 \text{ m} \pm 1 \%$  in diameter.
3. Equivalent test methods

If a method other than that described in section 2 is used, its equivalence must be demonstrated.

#### PART B: COMMERCIAL VEHICLE TYRES<sup>(6)</sup>

1. Preparing the tyre
  - 1.1. Mount a new tyre on the test rim specified by the manufacturer pursuant to section 6.11 of Appendix 1 to Annex I.
  - 1.2. Use a new inner tube or combination of inner tube, valve and flap (as required) when testing tyres with inner tubes.
  - 1.3. Inflate the tyre to the pressure corresponding to the pressure index specified by the tyre manufacturer, pursuant to section 6.14 of Appendix 1 to Annex I.
  - 1.4. Condition the tyre and wheel assembly at test room temperature for not less than three hours.
  - 1.5. Readjust the tyre pressure to that specified in section 1.3.
2. Test procedure
  - 2.1. Mount the tyre and wheel assembly on the test axle and press it against the outer face of a smooth power-driven test drum  $1,70 \text{ m} \pm 1 \%$  in diameter having a surface at least as wide as the tyre tread.
  - 2.2. Apply to test axle a series of test loads expressed as a percentage of the load indicated in Appendix 2, opposite the load index moulded on the sidewall of the tyre, in accordance with the load/speed test programme shown in the Table below. When the tyre has load capacity indices for both single and twin utilization, the reference load for single utilization is taken as the basis for the test loads.



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- 2.3. The tyre pressure must not be corrected throughout the test and the test load must be kept constant throughout each of the three test stages.
- 2.4. During the test the temperature in the test room must be maintained at between 20 °C and 30 °C or at a higher temperature if the manufacturer so agrees.
- 2.5. The load/speed test programme must be carried out without interruption.
3. Equivalent test methods

If a method other than that described in section 2 is used, its equivalence must be demonstrated.

#### LOAD/SPEED TEST PROGRAMME

| Load index  | Tyre speed category symbol | Test-drum speed (rev/min) <sup>a</sup> |                          | Load placed on the wheel as a percentage of the load corresponding to the load index |       |       |
|-------------|----------------------------|--|--------------------------|--|-------|-------|
|             |                            | Radial-ply tyre                        | Diagonal (bias-ply) tyre | 7 h.   | 16 h. | 24 h. |
| 122 or more | F                          | 100                                    | 100                      | 66 %   | 84 %  | 101 % |
|             | G                          | 125                                    | 100                      |  |       |       |
|             | J                          | 150                                    | 125                      |  |       |       |
|             | K                          | 175                                    | 150                      |  |       |       |
|             | L                          | 200                                    | —                        |  |       |       |
|             | M                          | 225                                    | —                        |  |       |       |
| 121 or less | F                          | 100                                    | 100                      | 70 %   | 88 %  | 106 % |
|             | G                          | 125                                    | 125                      |  |       |       |
|             | J                          | 150                                    | 150                      |  |       |       |
|             | K                          | 175                                    | 175                      |  |       |       |
|             | L                          | 200                                    | 175                      | 4 h.   | 6 h.  |       |
|             | M                          | 250                                    | 200                      | 75 %   | 97 %  | 114 % |
|             | N                          | 275                                    | —                        | 75 %   | 97 %  | 114 % |
|             | P                          | 300                                    | —                        | 75 %   | 97 %  | 114 % |

<sup>a</sup> 'Special-use' tyres (see section 2.1.3. of Annex II) should be tested at a speed equal to 85 % of the test-drum speed prescribed above for equivalent normal tyres.

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## Appendix 8

## VARIATION OF LOAD CAPACITY WITH SPEED

## COMMERCIAL-VEHICLE TYRES

RADIAL AND DIAGONAL (see Annex II, sections 2.30, 2.31 and 6.2.4)

| Speed (km/h)<br>h) | Variation of load capacity (%) |       |       |       |                                 |       |                                 |        |        |                |
|--------------------|--------------------------------|-------|-------|-------|---------------------------------|-------|---------------------------------|--------|--------|----------------|
|                    | All load indices               |       |       |       | Load indices <sup>a</sup> ≥ 122 |       | Load indices <sup>a</sup> ≤ 121 |        |        |                |
|                    | Speed category symbol          |       |       |       | Speed category symbol           |       | Speed category symbol           |        |        |                |
|                    | F                              | G     | J     | K     | L                               | M     | L                               | M      | N      | P <sup>b</sup> |
| 0                  | + 150                          | + 150 | + 150 | + 150 | + 150                           | + 150 | + 110                           | + 110  | + 110  | + 110          |
| 5                  | + 110                          | + 110 | + 110 | + 110 | + 110                           | + 110 | + 90                            | + 90   | + 90   | + 90           |
| 10                 | + 80                           | + 80  | + 80  | + 80  | + 80                            | + 80  | + 75                            | + 75   | + 75   | + 75           |
| 15                 | + 65                           | + 65  | + 65  | + 65  | + 65                            | + 65  | + 60                            | + 60   | + 60   | + 60           |
| 20                 | + 50                           | + 50  | + 50  | + 50  | + 50                            | + 50  | + 50                            | + 50   | + 50   | + 50           |
| 25                 | + 35                           | + 35  | + 35  | + 35  | + 35                            | + 35  | + 42                            | + 42   | + 42   | + 42           |
| 30                 | + 25                           | + 25  | + 25  | + 25  | + 25                            | + 25  | + 35                            | + 35   | + 35   | + 35           |
| 35                 | + 19                           | + 19  | + 19  | + 19  | + 19                            | + 19  | + 29                            | + 29   | + 29   | + 29           |
| 40                 | + 15                           | + 15  | + 15  | + 15  | + 15                            | + 15  | + 25                            | + 25   | + 25   | + 25           |
| 45                 | + 13                           | + 13  | + 13  | + 13  | + 13                            | + 13  | + 22                            | + 22   | + 22   | + 22           |
| 50                 | + 12                           | + 12  | + 12  | + 12  | + 12                            | + 12  | + 20                            | + 20   | + 20   | + 20           |
| 55                 | + 11                           | + 11  | + 11  | + 11  | + 11                            | + 11  | + 17,5                          | + 17,5 | + 17,5 | + 17,5         |
| 60                 | + 10                           | + 10  | + 10  | + 10  | + 10                            | + 10  | + 15,0                          | + 15,0 | + 15,0 | + 15,0         |
| 65                 | + 7,5                          | + 8,5 | + 8,5 | + 8,5 | + 8,5                           | + 8,5 | + 13,5                          | + 13,5 | + 13,5 | + 13,5         |
| 70                 | + 5,0                          | + 7,0 | + 7,0 | + 7,0 | + 7,0                           | + 7,0 | + 12,5                          | + 12,5 | + 12,5 | + 12,5         |
| 75                 | + 2,5                          | + 5,5 | + 5,5 | + 5,5 | + 5,5                           | + 5,5 | + 11,0                          | + 11,0 | + 11,0 | + 11,0         |
| 80                 | 0                              | + 4,0 | + 4,0 | + 4,0 | + 4,0                           | + 4,0 | + 10,0                          | + 10,0 | + 10,0 | + 10,0         |
| 85                 | - 3                            | + 2,0 | + 3,0 | + 3,0 | + 3,0                           | + 3,0 | + 8,5                           | + 8,5  | + 8,5  | + 8,5          |
| 90                 | - 6                            | 0     | + 2,0 | + 2,0 | + 2,0                           | + 2,0 | + 7,5                           | + 7,5  | + 7,5  | + 7,5          |
| 95                 | - 10                           | - 2,5 | + 1,0 | + 1,0 | + 1,0                           | + 1,0 | + 6,5                           | + 6,5  | + 6,5  | + 6,5          |
| 100                | - 15                           | - 5   | 0     | 0     | 0                               | 0     | + 5,0                           | + 5,0  | + 5,0  | + 5,0          |
| 105                |                                | - 8   | - 2   | 0     | 0                               | 0     | + 3,75                          | + 3,75 | + 3,75 | + 3,75         |

**a** The load capacity indices refer to single operations (see section 2.28.2 of Annex II).

**b** Load variations are not allowed above 160 km/h. For speed category symbols Q and above, the speed category corresponding to the speed category symbol (see section 2.29.3 of Annex II) specifies the maximum speed permitted for the tyre.

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|     |  |      |      |     |   |   |        |        |        |        |
|-----|--|------|------|-----|---|---|--------|--------|--------|--------|
| 110 |  | - 13 | - 4  | 0   | 0 | 0 | + 2,5  | + 2,5  | + 2,5  | + 2,5  |
| 115 |  |      | - 7  | - 3 | 0 | 0 | + 1,25 | + 1,25 | + 1,25 | + 1,25 |
| 120 |  |      | - 12 | - 7 | 0 | 0 | 0      | 0      | 0      | 0      |
| 125 |  |      |      |     |   | 0 | - 2,5  | 0      | 0      | 0      |
| 130 |  |      |      |     |   | 0 | - 5    | 0      | 0      | 0      |
| 135 |  |      |      |     |   |   | - 7,5  | - 2,5  | 0      | 0      |
| 140 |  |      |      |     |   |   | - 10   | - 5    | 0      | 0      |
| 145 |  |      |      |     |   |   |        | - 7,5  | - 2,5  | 0      |
| 150 |  |      |      |     |   |   |        | - 10   | - 5    | 0      |
| 155 |  |      |      |     |   |   |        |        | - 7,5  | - 2,5  |
| 160 |  |      |      |     |   |   |        |        | - 10   | - 5    |

**a** The load capacity indices refer to single operations (see section 2.28.2 of Annex II).

**b** Load variations are not allowed above 160 km/h. For speed category symbols Q and above, the speed category corresponding to the speed category symbol (see section 2.29.3 of Annex II) specifies the maximum speed permitted for the tyre.

### ANNEX III

#### ADMINISTRATIVE PROVISIONS FOR THE TYPE-APPROVAL OF VEHICLES WITH REGARD TO THE FITTING OF THEIR TYRES

1. APPLICATION FOR THE [F<sup>1</sup>EC TYPE-APPROVAL OF A VEHICLE TYPE
  - 1.1. The application for EC type-approval of a vehicle type with regard to its tyres is submitted by the vehicle manufacturer or by his authorized representative.
  - 1.2. It is accompanied, in triplicate, by a description of the vehicle type and of its tyres in terms of their tyre-size designation, speed category and load-capacity index, including any temporary-use spare unit(s), with which it may be fitted as described in the information document in Appendix 1.
  - 1.3. A vehicle representative of the vehicle type to be approved must be submitted to the technical service responsible for conducting the approval tests.
  - 1.4. The vehicle manufacturer or his representative may apply for the EC type-approval to be extended to include tyres of additional tyre-size designations, speed categories or load-capacity indices or additional temporary-use spare unit(s).
2. EC TYPE-APPROVAL] OF A VEHICLE
  - 2.1. EC type-approval is granted and an EC type-approval] number issued in respect of any vehicle type submitted in accordance with section 1 which satisfied the requirements of this Directive.
  - 2.2. Notice of approval or of extension or of refusal of approval of a vehicle type pursuant to this Directive is communicated to the Member States by means of a form conforming to the model in Appendix 2.

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2.3. An approval number is assigned to each vehicle type approved. The same Member State must not assign the same number to another vehicle type.

### 3. MODIFICATION OF VEHICLE TYPE

3.1. Every modification of a vehicle type must be notified to the approval authority which approved it. That approval authority may then either:

3.1.1. consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the vehicle still meets the requirements; or

3.1.2. refuse to approve the modification.

3.2. Confirmation or refusal of approval, specifying the alterations, is communicated to the other Member States by the procedure specified in sections 2.2.

### 4. CONFORMITY OF PRODUCTION

4.1. Every production vehicle to which this Directive applies must be so manufactured that it conforms to all of the relevant requirements of this Directive.

4.2. In order to verify that the requirements of section 4.1 are met, suitable controls of the production must be carried out.

4.3. The holder of the approval must in particular ensure the existence of procedures for effectively checking on compatibility between the characteristics of the vehicle and the characteristics of the tyres fitted as laid down within the framework of this Directive.

4.4. The approval authority which has granted type-approval may at any time verify the conformity control methods applicable to each production unit.

4.4.1. In every inspection, the test books and productions survey records must be presented to the visiting inspector.

4.5. The normal frequency of inspections authorized by the approval authority is one per year. In the case where negative results are recorded during one of these visits, the approval authority must ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.

### 5. PRODUCTION DEFINITELY DISCONTINUED

If the holder of an approval completely ceases to manufacture a type of vehicle approved in accordance with this Directive, he must so inform the authority which granted the approval. Upon receiving the relevant communication that authority must inform thereof the other approval authorities by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation 'PRODUCTION DISCONTINUED'.

## Appendix 1

### INFORMATION DOCUMENT No...

#### IN ACCORDANCE WITH ANNEX I TO COUNCIL DIRECTIVE 70/156/EEC RELATING TO [F<sup>1</sup>EC TYPE-APPROVAL] OF A VEHICLE TYPE WITH REGARD TO THE FITTING OF ITS TYRES

#### (DIRECTIVE 92/23/EEC)

The following information, if applicable, must be supplied in triplicate and must include a list of contents. Drawings, if any, must be supplied in appropriate scale and in sufficient detail on size A4 or folded to that size. In the case of microprocessor-controlled functions supply relevant performance-related information.

0. GENERAL
- 0.1. Make (trade name of manufacturer): .....
- 0.2. Type and commercial description(s): .....
- 0.3. Means of identification of type, if marked on the vehicle (b): .....
- 0.3.1. Location of that marking: .....
- 0.4. Category of vehicle (c): .....
- 0.5. Name and address of applicant: .....
- 0.6. Location of statutory plates and inscriptions and methods of affixing: .....
- 0.6.1. On the chassis: .....
- 0.6.2. On the bodywork: .....
- 0.7. Address(es) of assembly plant(s): .....
1. GENERAL CONSTRUCTION CHARACTERISTICS OF THE VEHICLE
- 1.3. Number of axles and wheels: .....
- 1.3.1. Number and position of axles with tyres in dual (twin) formation: .....
- 1.3.2. Number and position of steered axles: .....
- 1.3.3. Powered axles (number, position, interconnection): .....
- 1.4. Maximum design speed (for each variant, if any): .....
2. MASSES AND DIMENSIONS (e) (in kg and mm) (refer to drawing where applicable)
- 2.1. Maximum technically permissible mass for each axle: .....
6. SUSPENSION:
- 6.2. Tyres and wheels normally fitted: .....
- 6.2.1. Attached is a list presented by the vehicle manufacturer of all the relevant variants (if any) of the vehicle type and the corresponding tyres for use on each. The description of the tyres must include the following information:
- the tyre-size designation,
  - the minimum load-capacity index compatible with the maximum axle load (each axle to be stated separately if more than one tyre size designation is fitted to the vehicle),
  - the minimum speed category symbol compatible with the maximum design speed.
- 6.2.4. Tyre pressure(s) as recommended by the vehicle manufacturer (kPa): .....
- 6.2.5. Tyre/wheel combination(s): .....
- 6.2.6. Brief description of temporary-use spare unit(s), if any: .....

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Appendix 2

MODEL

[(maximum format: A4 (210 × 297 mm)]

[<sup>F1</sup>EC TYPE-APPROVAL] CERTIFICATE

(vehicle)

Stamp of Administration

Communication concerning the:

- type-approval (1),
- extension of type-approval (1),
- refusal of type-approval (1),

of a type of vehicle with regard to Directive 92/23/EEC.

►<sup>(1)</sup>EC type-approval ◀No: ..... Extension No: .....

SECTION I

- 0. General
0.1. Make (trade name of manufacturer): .....
0.2. Commercial description(s): .....
0.3. Means of identification of type, if marked on the vehicle (b): .....
0.3.1. Location of that marking: .....
0.4. Category of vehicle (c): .....
0.5. Name and address of applicant: .....
0.6. Location of statutory plates and inscriptions and methods of affixing: .....
0.6.1. On the chassis: .....
0.6.2. On the bodywork: .....
0.7. Address(es) of assembly plant (s): .....

(1) Delete where inapplicable.

SECTION II

1. **Additional information**
  - 1.1. Attached is a list presented by the vehicle manufacturer of all the relevant variants (if any) of the vehicle type and the corresponding tyres for use on each. The description of the tyres must include only the following information:
    - the tyre size designation,
    - the minimum speed category symbol compatible with the maximum design speed,
    - the minimum load-capacity index compatible with the maximum axle load (each axle to be stated separately if more than one tyre size designation is fitted to the vehicle).
  - 1.2. Brief description of temporary-use spare unit(s), if any: .....
  - 1.2.1. Technical service responsible for carrying out the tests: .....
  - 1.2.2. Date of test report: .....
  - 1.2.3. Number of test report: .....
  - 1.2.4. Grounds for extending EC type-approval (where appropriate): .....
  - 1.2.5. Comments (if any): .....
  - 1.2.6. Place: .....
  - 1.2.7. Date: .....
  - 1.2.8. Signature: .....
  - 1.2.9. A list of documents making up the type-approval file lodged with the approval authority that has granted type-approval, which may be obtained on request, is attached.

ANNEX IV

REQUIREMENTS FOR VEHICLES WITH REGARD TO THE FITTING OF THEIR TYRES

1. DEFINITIONS

.....

2. For the purpose of this Directive:
  - 2.1. *'approval of a vehicle'* means the approval of a vehicle type with regard to its tyres, including temporary-use spare tyres;
  - 2.2. *'vehicle type'* means a range of vehicles which do not differ significantly, at least as regards each variant of the vehicle type, in such essential aspects as would affect the tyre size designation, the speed category symbol or the load capacity index:

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- 2.3. 'wheel' means a complete wheel consisting of a rim and a wheel disc;
- 2.4. 'temporary-use spare wheel' means a wheel different from one of the normal wheels on the vehicle type;
- 2.5. 'unit' means an assembly of a wheel and tyre;
- 2.6. 'normal unit' means a unit which is capable of being fitted to the vehicle for normal operation;
- 2.7. 'spare unit' means a unit which is intended to be exchanged for a normal unit in case of malfunction of the latter. A 'spare unit' may be either of the following:
- 2.7.0. 'normal spare unit', which is a unit that conforms to the normal unit of the vehicle type;
- 2.7.1. 'temporary-use spare unit', which is a unit that differs from the normal units of the vehicle type with regard to their principal characteristics (e.g. their tyre-size designation, functional dimensions, conditions of use or structure). It is intended for temporary use under restricted conditions. Temporary-use spare units may be of the following categories:
- 2.7.1.1. category 1
- a unit consisting of a wheel which conforms to a wheel of a normal unit and a tyre which has principal characteristics (e.g. dimensions, structure) different to the normal tyre;
- 2.7.1.2. category 2
- a unit consisting of a wheel and a tyre both having principal characteristics different to the normal unit and intended to be carried on the vehicle with the tyre inflated to the pressure specified for temporary use;
- 2.7.1.3. category 3
- a unit consisting of a normal wheel and a tyre having principal characteristics different to a normal tyre and intended to be carried on the vehicle with the tyre folded and not inflated;
- 2.7.1.4. category 4
- a unit consisting of a wheel and tyre both having principal characteristics different to a normal unit and intended to be carried on the vehicle with the tyre folded and not inflated;
- 2.8. 'maximum mass' means the maximum value stated by the vehicle manufacturer to be technically permissible for the vehicle;
- 2.9. 'maximum axle load' means the maximum value stated by the vehicle manufacturer to be technically permissible for the total vertical force between the contact surfaces of the tyres of the axle in question and the ground and resulting from the part of the vehicle mass supported by that axle. The sum of the axle loads may be greater than the value corresponding to the maximum mass of the vehicle;
- 2.10. 'functional dimensions' means dimensions derived from the size designation of the wheels and/or tyres (e.g. diameter, width, aspect ratio) and from the mounting of the unit to the vehicle (e.g. wheel offset);
- 2.11. 'maximum design speed' means the maximum speed approved for the vehicle type inclusive of the tolerance allowed for the conformity checks of the series production.



3. REQUIREMENTS FOR VEHICLES WITH REGARD TO THE FITTING OF THEIR TYRES
  - 3.1. General
    - [<sup>F1</sup>3.1.1. Subject to the provisions of section 3.7.4., every tyre fitted to a vehicle, including where applicable any spare, must bear the EC type-approval mark(s) as specified in section 4 of Annex I or the type-approval mark indicating compliance with UN/ECE Regulations Nos 30 or 54. UN/ECE type-approval marks are considered to be equivalent only to the EC type-approval marks granted pursuant to Annex II.]
  - 3.2. Tyre fitment
    - 3.2.1. All of the tyres fitted to a vehicle, excluding any temporary use spare, must have the same structure (see Annex II section 2.3).
    - 3.2.2. All of the tyres fitted to one axle must be of the same type (see Annex II section 2.1).
    - 3.2.3. The space in which the wheel revolves must be such as to allow unrestricted movement when using the maximum permissible size of tyres within the suspension and steering constraints provided by the vehicle manufacturer.
  - 3.3. Load capacity
    - 3.3.1. Subject to the provisions of section 3.7, the maximum load rating (see Annex II section 2.31) of every tyre, including a spare tyre (if provided) with which a vehicle is fitted is:
      - 3.3.1.1. in the case of a vehicle fitted with tyres of the same type in single formation: at least equal to half of the maximum axle load (see section 2.9) for the most heavily loaded axle, as declared by the manufacturer of the vehicle;
      - 3.3.1.2. in the case of a vehicle fitted with tyres of more than one type, in single formation: at least equal to half of the maximum axle load (see section 2.9), as declared by the manufacturer of the vehicle, in respect of the relevant axle;
      - 3.3.1.3. in the case of a vehicle fitted with passenger car tyres in dual (twin) formation: at least equal to 0,27 times the maximum axle load, as declared by the manufacturer of the vehicle, in respect of the relevant axle;
      - 3.3.1.4. in the case of axles fitted with commercial vehicle tyres in dual (twin) formation: at least equal to 0,25 times, with reference to the load capacity index for dual application, the maximum axle load as declared by the manufacturer of the vehicle, in respect of the relevant axle.
  - 3.4. Speed capacity
    - 3.4.1. Every tyre with which a vehicle is normally fitted must have a speed category symbol (see Annex II section 2.29) compatible with the maximum design speed of the vehicle (as declared by the vehicle manufacturer) or the applicable load/speed combination (see Annex II section 2.30).
    - 3.4.2. The above specification does not apply:
      - 3.4.2.1. in the case of temporary use spare units for which section 3.8 applies;
      - 3.4.2.2. in the case of vehicles normally equipped with ordinary tyres and occasionally supplied with snow tyres.

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However, in this case the speed category symbol of the snow tyres must correspond to a speed either greater than the maximum design speed of the vehicle (as declared by the vehicle manufacturer) or not less than 160 km/h (or both).

If, nevertheless, the maximum design speed of the vehicles (as declared by the vehicle manufacturer) is greater than the speed corresponding to the speed category symbol of the snow tyres a maximum speed warning label, specifying the maximum speed capability of the snow tyres, must be displayed inside the vehicle in a prominent position readily visible to the driver.

### 3.5. Spare tyre

3.5.1. In the case where a vehicle is provided with a spare wheel its tyre must be:

- 3.5.1.1. the same type as one of the tyres fitted to or approved for the vehicle, or
- 3.5.1.2. a temporary-use spare tyre of a type suitable for use on the vehicle, in any position. However, no vehicle other than a vehicle of category M<sub>1</sub> may be fitted with a temporary-use spare tyre.
- 3.5.2. Every vehicle provided with a temporary-use spare unit must be provided with supplementary information clearly and permanently displayed on the temporary-use spare unit or on the vehicle near the spare unit or in the driver's handbook. At least the following information must be given:
  - 3.5.2.1. an instruction to drive with caution when the temporary-use spare unit is fitted, and to install a normal unit as soon as possible;
  - 3.5.2.2. a statement that operation of the vehicle is not permitted with more than one temporary-use spare unit fitted at the same time;
  - 3.5.2.3. a clear indication of the inflation pressure specified by the vehicle manufacturer for the tyre of the temporary-use spare unit;
  - 3.5.2.4. for vehicles equipped with category 3 or category 4 temporary-use spare units, a description of the procedure for inflating the tyre to the pressure specified for temporary use by means of the device referred to in section 3.6;

### 3.6. Inflating device of temporary-use spare unit:

3.6.1. if the vehicle is equipped with a category 3 or category 4 temporary-use spare unit, a device must be provided on the vehicle which permits the tyre to be inflated to the pressure specified for temporary use within a maximum of five minutes.

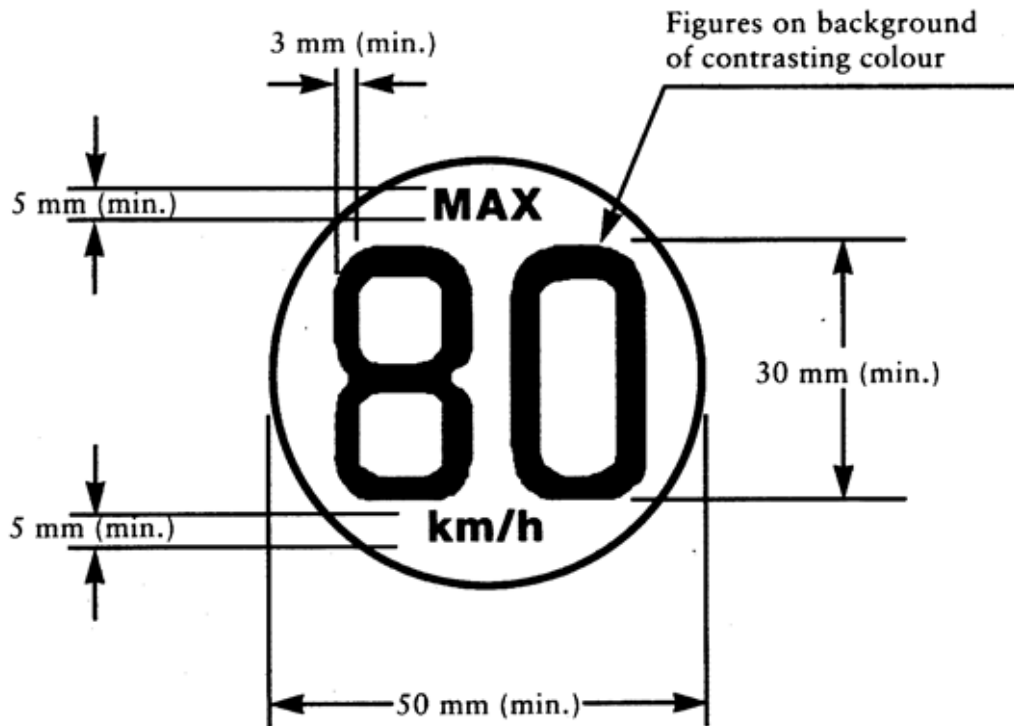
### 3.7. Special cases

- 3.7.1. In the case of trailers of categories 01 and 02 with operating speeds restricted to 100 km/h or less fitted with passenger car tyres in single formation, the maximum load rating of every tyre must be at least equal to 0,45 times the maximum mass for the most heavily loaded axle, as declared by the manufacturer of the trailer. For tyres in dual (twin) formation this factor is 0,24.
- 3.7.2. In the case of some special vehicles fitted with commercial vehicle tyres, the table 'Variation of Load Capacity with Speed' (see section 2.30 and Appendix 8 to Annex II) is not to be applied. In those cases the tyre maximum load ratings to check against the maximum axle loads (see sections 3.3.1.2 and 3.3.1.4 of this Annex) are determined by multiplying the load corresponding to the load capacity index by an appropriate coefficient which is related to the type of vehicle and its use rather than to

the maximum design speed of the vehicle. In such cases section 3.4.1 of this Annex does not apply. The appropriate coefficients are as follows:

- 3.7.2.1. 1,10 in the case of vehicles of category M<sub>3</sub> when the vehicle is carrying standing passengers and the operating speed does not exceed 60 km/h. However, for operational reasons Member States may allow the operating speed to be increased to 80 km/h;
- 3.7.2.2. 1,15 in the case of such vehicles (M<sub>3</sub>) if they are intended for use only on urban routes with frequent stops;
- 3.7.2.3. 1,10 in the case of public utility vehicles of category N used at slow speeds over short distances in urban and suburban applications such as road sweepers or refuse collectors.
- 3.7.3. When a motor vehicle of category M<sub>1</sub> is towing a trailer, the additional load imposed at the trailer coupling device may cause the tyre maximum load ratings to be exceeded, but not by more than 15 %, provided that the operating speed is restricted to 100 km/h or less and the inflation pressure increased by at least 0,2 bar is applied.
- 3.7.4. In the case of a vehicle which is fitted with tyres which are not passenger car tyres nor commercial vehicle tyres due to special conditions of use (e.g. agricultural tyres, industrial truck tyres, motor cycle tyres) the requirements of Annex II do not apply provided that the approval authority is satisfied that the tyres fitted are suitable for the operating conditions of the vehicle.
- 3.8. Specifications for temporary-use spare units
  - 3.8.1. Every temporary-use spare tyre must have a speed category at least equal to 120 km/h (speed category symbol L).
  - 3.8.2. When fitted to the vehicle for temporary use the outward facing surface of the wheel must exhibit a distinctive colour or colour pattern which is clearly different from the colour(s) of the normal units. If it is possible to attach a wheel cover to the temporary-use spare unit the distinctive colour or colour pattern must not be obscured by this wheel cover.
  - 3.8.3. A maximum speed warning symbol must be permanently displayed on the outer face of the wheel in a prominent position and in accordance with the diagram below:

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Scale – full size (1:1)

### [<sup>F3</sup>ANNEX V

#### TYRE/ROAD NOISE EMISSION

##### 1. SCOPE

This annex applies to the EC type-approval of tyres, as components, in respect of tyre/road noise emissions.

##### 2. DEFINITIONS

For the purposes of this Annex, the definitions of Annex II shall apply, except for the definition under section 2.1., which shall read as follows:

##### 2.1. 'Type of tyre'

means, in relation to type-approval pursuant to this Annex (tyre/road noise emission), a range of tyres consisting of a list of tyre size designations (see section 2.17 in Annex II), brand names, trade marks and trade descriptions which do not differ in such essential characteristics as:

- the manufacturer's name
- the tyre classification (see section 2.4. of this Annex)

- the tyre structure (see section 2.1.4. of Annex II)
- the category of use (see section 2.1.3. of Annex II)
- for class C1 tyres. Reinforced or Extra Load
- the tread pattern (see 2.3 of Information Document, Annex I, Appendix 3).

Note:

The effect of changes in minor details of tyre tread and construction on the tyre/road noise emission will be determined during checks on the conformity of production.

In addition, the following definitions shall also apply:

- 2.2. ‘Brand name or trade description’  
means the identification for the tyre as provided by the tyre manufacturer. The brand name may be the same as the manufacturer and the trade description may coincide with the trade mark.
- 2.3. ‘Tyre/road noise emission’  
means the noise arising from the contact between tyres in motion and the road surface.
- 2.4. For the purpose of this Annex, the following classification shall apply:

|                |   |
|----------------|---|
| class C1 tyres | passenger car tyres (see section 2.32. of Annex II);  |
| class C2 tyres | commercial vehicle tyres (see section 2.33. of Annex II) with load capacity index in single formation $\leq 121$ and speed category symbol $\geq$ ‘N’ (see section 2.29.3. of Annex II);  |
| class C3 tyres | commercial vehicle tyres (see section 2.33. of Annex II) with load capacity index in single formation $\leq 121$ and speed category symbol $\leq$ ‘M’ (see section 2.29.3. of Annex II) or commercial vehicle tyres (see section 2.33. of Annex II) with load capacity index in single formation $\geq 122$ . |

### 3. MARKING REQUIREMENTS

- 3.1. In addition to other marking requirements given in section 4 of Annex I and section 3 of Annex II, the tyre must bear the following markings:
- 3.1.1. the manufacturer's name or trade mark; the brand name, the trade description or the trade mark.

### 4. TYRE/ROAD NOISE EMISSION REQUIREMENTS

#### 4.1. General requirements

A set of four tyres bearing the same tyre size designation and tread pattern that is representative of the range of tyres, shall be submitted to a tyre/road noise emission level test to be carried out as specified in Appendix 1.

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4.2. The noise levels determined in accordance with section 4.5 of Appendix 1 shall not exceed the following limits:

4.2.1. Class C1 tyres, with reference to the nominal section width (see Annex II, section 2.17.1.1.) of the tyre that has been tested:

| Tyre Class | Nominal section width (mm) | Limit values in dB(A) |                 |                 |
|------------|----------------------------|-----------------------|-----------------|-----------------|
|            |                            | A                     | B <sup>d</sup>  | C <sup>de</sup> |
| C1a        | ≤ 145                      | 72 <sup>a</sup>       | 71 <sup>a</sup> | 70              |
| C1b        | > 145 ≤ 165                | 73 <sup>a</sup>       | 72 <sup>a</sup> | 71              |
| C1c        | > 165 ≤ 185                | 74 <sup>a</sup>       | 73 <sup>a</sup> | 72              |
| C1d        | > 185 ≤ 215                | 75 <sup>b</sup>       | 74 <sup>b</sup> | 74              |
| C1e        | > 215                      | 76 <sup>c</sup>       | 75 <sup>c</sup> | 75              |

a Limit values in column A shall apply until 30 June 2007; Limit values in column B shall apply as from 1 July 2007.

b Limit values in column A shall apply until 30 June 2008; Limit values in column B shall apply as from 1 July 2008.

c Limit values in column A shall apply until 30 June 2009; Limit values in column B shall apply as from 1 July 2009.

d Indicative figures only. Definitive figures will depend on amendment of the Directive following the report required in Article 3(2) of Directive 2001/43/EC.

e Limit values for column C will result from the amendment of the Directive following the report required in Article 3(2) of Directive 2001/43/EC.

4.2.1.1. For reinforced (or Extra Load) tyres (see Annex II, section 3.1.8.), the limit values in section 4.2.1. shall be increased by 1 dB(A)

4.2.1.2. For tyres classified in category of use 'Special', (see Annex II, section 2.1.3.), the limit values in section 4.2.1. shall be increased by 2 dB(A).

4.2.2. Class C2 tyres with reference to the category of use (see Annex II, section 2.1.3.) of the range of tyres:

| Category of use | Limit value expressed in dB(A) |
|-----------------|--------------------------------|
| Normal          | 75                             |
| Snow            | 77                             |
| Special         | 78                             |

4.2.3. Class C3 tyres, with reference to the category of use (see Annex II, section 2.1.3.) of the range of tyres:

| Category of use | Limit value expressed in dB(A) |
|-----------------|--------------------------------|
| Normal          | 76                             |
| Snow            | 78                             |

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Special

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## Appendix 1

### TEST METHOD FOR TYRE-ROAD SOUND LEVELS COAST-BY METHOD

#### 0. Introduction

The presented method contains specifications on measuring instruments, measurement conditions and the measurement method, in order to obtain the noise level of a set of tyres mounted on a test vehicle rolling at high speed on a specified road surface. The maximum sound pressure level is to be recorded, when the test vehicle is coasting, by remote-field microphones; the final result of a reference speed is obtained from a linear regression analysis. Such test results cannot be related to tyre noise measured during acceleration under power or deceleration during braking.

#### 1. Measuring instruments

##### 1.1. Acoustic measurements

The sound level meter or the equivalent measuring system, including the windscreen recommended by the manufacturer, shall at least meet the requirements of Type 1 instruments in accordance with IEC 60651, second edition.

The measurements shall be made using the frequency weighting A, and the time weighting F.

When using a system that includes a periodic monitoring of the A-weighted sound level, a reading should be made at a time interval not greater than 30 ms.

##### 1.1.1. Calibration

At the beginning and at the end of every measurement session, the entire measurement system shall be checked by means of a sound calibrator that fulfils the requirements for sound calibrators of at least precision Class 1 according to IEC 942:1988. Without any further adjustment the difference between the readings of two consecutive checks shall be less than or equal to IEC 942:1988. Without any further adjustment the difference between the readings of two consecutive checks shall be less than or equal to 0,5 dB. If this value is exceeded, the results of the measurements obtained after the previous satisfactory check shall be discarded.

##### 1.1.2. Compliance with requirements

The compliance of the sound calibration device with the requirements of IEC 60942:1988 shall be verified once a year and the compliance of the instrumentation system with the requirements of IEC 60651:1979/A1:1993, second edition, shall be verified at least every two years by a laboratory which is authorised to perform calibrations traceable to the appropriate standards.

##### 1.1.3. Positioning of the microphone

The microphone (or microphones) must be located at a distance of  $7,5 \text{ m} \pm 0,05 \text{ m}$  from track reference line CC<sup>1</sup> (*figure 1*) and  $1,2 \text{ m} \pm 0,02 \text{ m}$  above the ground. Its axis of maximum sensitivity must be horizontal and perpendicular to the path of the vehicle (line CC<sup>1</sup>).

#### 1.2. Speed measurements

The vehicle speed shall be measured with instruments with an accuracy of  $\pm 1 \text{ km/h}$  or better when the front end of the vehicle has reached line PP' (*figure 1*).

#### 1.3. Temperature measurements



Measurements of air as well as test surface temperature are mandatory. The temperature measuring devices shall be accurate within  $\pm 1$  °C.

#### 1.3.1. Air temperature

The temperature sensor is to be positioned in an unobstructed location close to the microphone in such a way that it is exposed to the airflow and protected from direct solar radiation. The latter may be achieved by any shading screen or similar device. The sensor should be positioned at a height of  $1,2 \text{ m} \pm 0,1 \text{ m}$  above the test surface level in order to minimise the influence of the test surface thermal radiation at low airflows.

#### 1.3.2. Test surface temperature

The temperature sensor is to be positioned in a location where the temperature measured is representative of the temperature in the wheel tracks, without interfering with the sound measurement.

If an instrument with a contact temperature sensor is used, heat-conductive paste shall be applied between the surface and the sensor to ensure adequate thermal contact.

If a radiation thermometer (pyrometer) is used, the height should be chosen to ensure that a measuring spot with a diameter of  $\geq 0,1 \text{ m}$  is covered.

#### 1.4. Wind measurement

The device must be capable of measuring the wind speed with a tolerance of  $\pm 1 \text{ m/s}$ . The wind shall be measured at microphone height. The wind direction with reference to the driving direction shall be recorded.

### 2. Conditions of measurement

#### 2.1. Test site

The test site must consist of a central section surrounded by a substantially flat test area. The measuring section must be level; the test surface must be dry and clean for all measurements. The test surface shall not be artificially cooled during or prior to the testing.

The test track must be such that the conditions of a free sound field between the sound source and the microphone are attained to within 1 dB(A). These conditions shall be deemed to be met if there are no large sound reflecting objects such as fences, rocks, bridges or buildings within 50 m of the centre of the measuring section. The surface of the test track and the dimensions of the test site shall be in accordance with Appendix 2 of this Annex.

A central part of at least 10 m radius shall be free of powdery snow, tall grass, loose soil, cinders or the like. There must be no obstacle which could affect the sound field within the vicinity of the microphone and no persons shall stand between the microphone and the sound source. The operator carrying out the measurements and any observers attending the measurements must position themselves so as not to affect the readings of the measuring instruments.

#### 2.2. Meteorological conditions

Measurements shall not be made under poor atmospheric conditions. It must be ensured that the results are not affected by gusts of wind. Testing shall not be performed if the wind speed at the microphone height exceeds 5 m/s.

Measurements shall not be made if the air temperature is below 5 °C or above 40 °C or the test surface temperature is below 5 °C or above 50 °C.

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### 2.3. Ambient noise

The background sound level (including any wind noise) shall be at least 10 dB(A) less than the measured tyre-road sound emission. A suitable windscreen may be fitted to the microphone provided that account is taken of its effect on the sensitivity and directional characteristics of the microphone.

Any measurement affected by a sound peak which appears to be unrelated to the characteristics of the general sound level of tyres shall be ignored.

### 2.4. Test vehicle requirements

#### 2.4.1. General

The test vehicle shall be a motor vehicle and be fitted with four single tyres on just two axles.

#### 2.4.2. Vehicle load

The vehicle must be loaded such as to comply with the test tyre loads as specified in section 2.5.2. below.

#### 2.4.3. Wheelbase

The wheelbase between the two axles fitted with the test tyres shall for Class C1 be less than 3,50 m and for Class C2 and Class C3 tyres be less than 5 m.

#### 2.4.4. Measures to minimise vehicle influence on sound level measurements

To ensure that tyre noise is not significantly affected by the test vehicle design the following requirements and recommendations are given.

Requirements:

- (a) Spray suppression flaps or other extra device to suppress spray shall not be fitted.
- (b) Addition or retention of elements in the immediate vicinity of the rims and tyres, which may screen the emitted sound, is not permitted.
- (c) Wheel alignment (toe in, camber and castor) shall be in full accordance with the vehicle manufacturer's recommendations.
- (d) Additional sound absorbing material may not be mounted in the wheel housings or under the underbody.
- (e) Suspension shall be in such a condition that it does not result in an abnormal reduction in ground clearance when the vehicle is loaded in accordance with the testing requirement. If available, body level regulation systems shall be adjusted to give a ground clearance during testing which is normal for unladen condition.

Recommendations to avoid parasitic sound:

- (a) Removal or modification of components on the vehicle that any contribute to the background sound of the vehicle is recommended. Any removals or modifications shall be recorded in the test report.
- (b) During testing it should be ascertained that brakes are not poorly released, causing brake noise.

- (c) It should be ascertained that electric cooling fans are not operating.
- (d) Windows and sliding roof of the vehicle shall be closed during testing.

## 2.5. Tyres

### 2.5.1. General

Four identical tyres of the same type and range must be fitted to the test vehicle. In the case of tyres with a load capacity index in excess of 121 and without any dual fitting indication, two of these tyres of the same type and range must be fitted to the rear axle of the test vehicle; the front axle must be fitted with tyres of a size suitable for the axle load and planed down to the minimum depth in order to minimise the influence of tyre/road contact noise while maintaining a sufficient level of safety. Winter tyres that in certain Member States may be equipped with studs intended to enhance friction shall be tested without this equipment. Tyres with special fitting requirements shall be tested in accordance with these requirements (e.g. rotation direction). The tyres must have full tread depth before being run-in.

Tyres are to be tested on rims permitted by the tyre manufacturer.

### 2.5.2. Tyre loads

The test load  $Q_t$  for each tyre on the test vehicle shall be 50 % to 90 % of the reference load  $Q_r$ , but the average test load  $Q_{t,avr}$  of all tyres shall be 75 %  $\pm$  5 % of the reference load  $Q_r$ .

For all tyres the reference load  $Q_r$  corresponds to the maximum mass associated with the load capacity index of the tyre. In the case where the load capacity index is constituted by two numbers divided by slash (/), reference shall be made to the first number.

### 2.5.3. Tyre inflation pressure

Each tyre fitted on the test vehicle shall have a test pressure  $P_t$  not higher than the reference pressure  $P_r$  and within the interval:

$$P_r(Q_t/Q_r)^{1,25} \leq P_t \leq 1,1 P_r(Q_t/Q_r)^{1,25}$$

where  $P_r$  is the pressure corresponding to the pressure index marked on the sidewall.

For Class C1 the reference pressure is  $P_r = 250$  kPa for 'standard' tyres and 290 kPa for 'reinforced' tyres, the minimum test pressure shall be  $P_t = 150$  kPa.

### 2.5.4. Preparations prior to testing

The tyres should be 'run-in' prior to testing to remove compound nodules or other tyre pattern characteristics resulting from the moulding process. This will normally require the equivalent of about 100 km of normal use on the road.

The tyres fitted to the test vehicle shall rotate in the same direction as when they were run-in.

Prior to testing tyres shall be warmed up by running under test conditions.

## 3. Method of testing

### 3.1. General conditions

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For all measurements the vehicle must be driven in a straight line over the measuring section (AA' to BB') in such a way that the median longitudinal plane of the vehicle is as close as possible to the line CC'.

When the front end of the test vehicle has reached the line AA', the vehicle's driver must have put the gear selector on neutral position and switched off the engine. If abnormal noise (e.g. ventilator, self-ignition) is emitted by the test vehicle during the measurement, the test must be repeated.

### 3.2. Nature and number of measurements

The maximum sound level expressed in A-weighted decibels (dB(A)) shall be measured to the first decimal place as the vehicle is coasting between lines AA' and BB' (*figure 1* — front end of the vehicle on line AA', rear end of the vehicle on line BB'). This value will constitute the result of the measurement.

At least four measurements shall be made on each side of the test vehicle at test speeds lower than the reference speed specified in paragraph 4.1. and at least four measurements at test speeds higher than the reference speed. The speeds shall be approximately equally spaced over the speed range specified in paragraph 3.3.

### 3.3. Test speeds

The test vehicle speeds shall be within the range:

- (i) from 70 km/h to 90 km/h for Class C1 and Class C2 tyres;
- (ii) from 60 km/h to 80 km/h for Class C3 tyres.

## 4. Interpretation of results

The measurement shall be invalid if an abnormal discrepancy between the maximum value and the other values is recorded.

### 4.1. Determination of test result

Reference speed  $V_{\text{ref}}$  used to determine the final result will be:

- (i) 80 km/h for Class C1 and Class C2 tyres;
- (ii) 70 km/h for Class C3 tyres.

### 4.2. Regression analysis of noise measurements

The (not temperature corrected) tyre-road noise level  $L_R$  in dB(A) is determined by a regression analysis according to:

where:

$$\bar{L}$$

is the mean value of the noise levels  $L_i$ , measured in dB(A):

$n$  is the measurement number ( $n \geq 16$ ),

$$\bar{v}$$

is the mean value of logarithms of speeds  $v_i$ :

With

$a$  is the slope of the regression line in dB(A):

#### 4.3. Temperature correction

For Class C2 tyres, the final result shall be normalised to a test surface reference temperature  $\theta_{\text{ref}}$  by applying a temperature correction, according to the following:

$$L_R(\theta_{\text{ref}}) = L_R(\theta) + K(\theta_{\text{ref}} - \theta)$$

where  $\theta$  is the measured test surface temperature,

$$\theta_{\text{ref}} = 20^\circ\text{C},$$

For Class C1 tyres, the coefficient  $K$  is  $-0,03 \text{ dB(A)/}^\circ\text{C}$  when  $\theta > \theta_{\text{ref}}$  and  $K$  is  $-0,06 \text{ dB(A)/}^\circ\text{C}$  when  $\theta < \theta_{\text{ref}}$ .

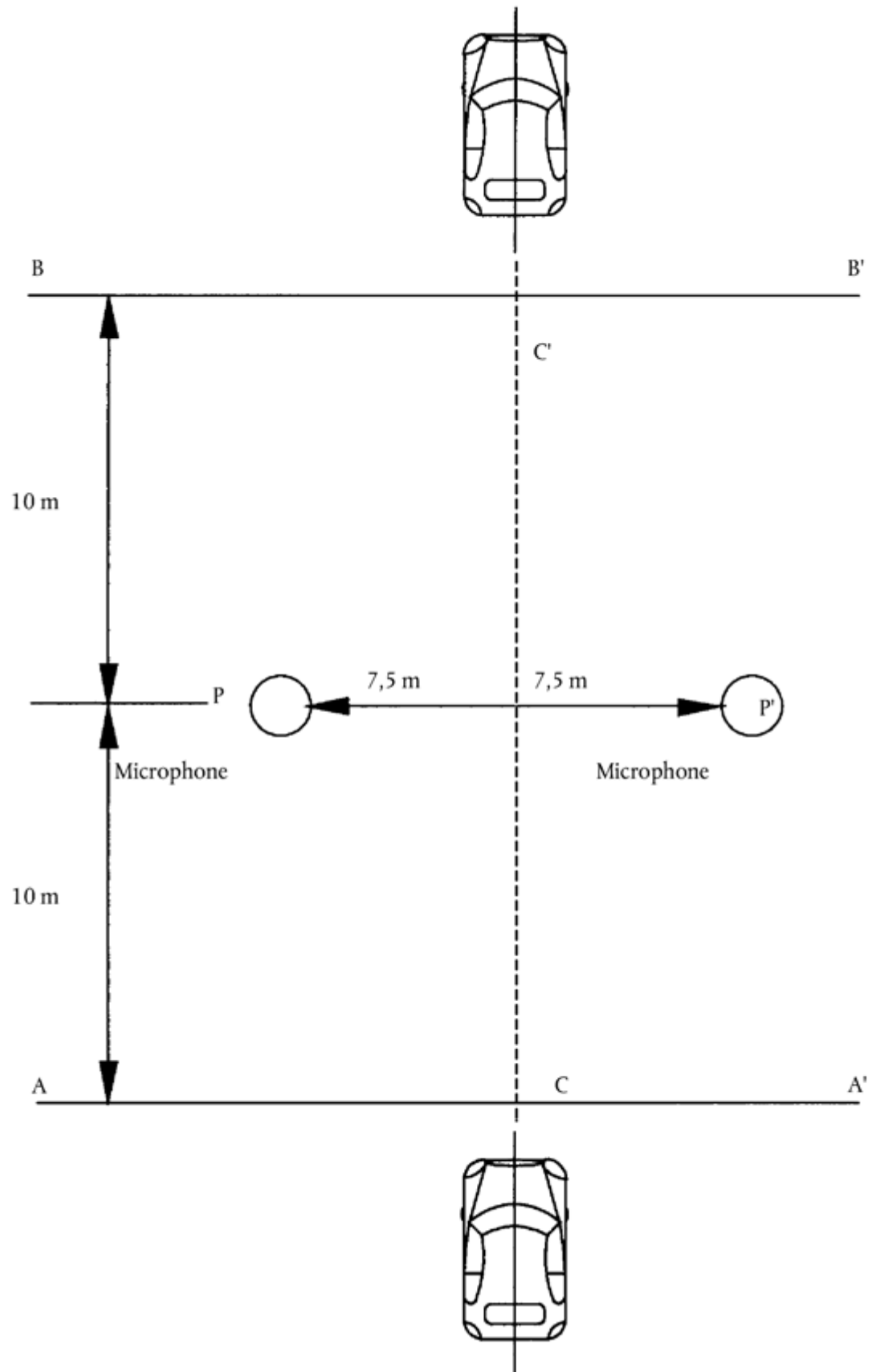
For Class C2 tyres, the coefficient  $K$  is  $-0,02 \text{ dB(A)/}^\circ\text{C}$

If the measured test surface temperature does not change by more than  $5^\circ\text{C}$  within all measurements necessary for the determination of the sound level of one set of tyres, the temperature correction may be made only on the final reported tyre-road sound level as indicated above, utilizing the arithmetic mean value of the measured temperatures. Otherwise each measured sound level  $L_i$  shall be corrected, utilizing the temperature at the time of the sound recording.

There will be no temperature correction for Class C3 tyres.

- 4.4. In order to take account of any measuring instrument inaccuracies, the results according to section 4.3. shall be reduced by 1 dB(A).
- 4.5. The final result, the temperature corrected tyre-road noise level  $L_R(\theta_{\text{ref}})$  in dB(A), shall be rounded down to the nearest lower whole value.

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## Appendix 2

### TEST REPORT

The test report shall include the following information:

- (a) meteorological conditions inclusive of air and test surface temperature for each test run,
- (b) date and method of check on compliance of the test surface with ISO 10844:1994,
- (c) test rim width,
- (d) tyre data: manufacturer, brand name, trade name, size, load index, reference pressure,
- (e) test vehicle description and wheelbase,
- (f) type test load  $Q_t$  in N and in per cent of the reference load  $Q_r$  for each test tyre, average test load  $Q_{t,avr}$  in N and in per cent of the reference load  $Q_r$ ,
- (g) cold inflation pressure in kPa for each test tyre,
- (h) test speeds when the vehicle passed line PP',
- (i) maximum A-weighted sound levels for each test run and each microphone,
- (j) the test result  $L_R$ : A-weighted sound level in decibel at reference speed, corrected for temperature (if applicable), rounded down to the nearest lower whole value.
- (k) regression line slope.]

### [<sup>F3</sup>ANNEX VI

#### SPECIFICATIONS FOR THE TEST SITE

##### 1. Introduction

This annex describes the specifications relating to the physical characteristics and the laying of the test track. These specifications based on a special standard<sup>(7)</sup> describe the required physical characteristics as well as the test methods for these characteristics.

##### 2. Required characteristics of the surface

A surface is considered to conform to this standard provided that the texture and voids content or sound absorption coefficient have been measured and found to fulfil all the requirements of sections 2.1. to 2.4. below and provided that the design requirements (section 3.2.) have been met.

##### 2.1. Residual voids content

The residual voids content (VC) of the test track paving mixture shall not exceed 8 %. For the measurement procedure, see section 4.1.

##### 2.2. Sound absorption coefficient

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If the surface fails to comply with the residual voids content requirement, the surface is acceptable only if its sound absorption coefficient  $\alpha \leq 0,10$ . For the measurement procedure, see section 4.2. The requirement of sections 2.1. and 2.2. is also met if only sound absorption has been measured and found to be  $\alpha \leq 0.10$ .

Note:

The most relevant characteristic is the sound absorption, although the residual voids content is more familiar among road constructors. However, sound absorption needs to be measured only if the surface fails to comply with the voids requirement. This is justified because the residual voids content has relatively large uncertainties in terms of both measurements and relevance and some surfaces may therefore erroneously be rejected when based only on the voids measurement.

### 2.3. Texture depth

The texture depth (TD) measured according to the volumetric method (see section 4.3. below) shall be:

$$TD \geq 0,4 \text{ mm}$$

### 2.4. Homogeneity of the surface

Every practical effort shall be taken to ensure that the surface is made to be as homogeneous as possible within the test area. This includes the texture and voids content, but it should also be observed that if the rolling process results in more effective rolling at some places than others, the texture may be different and unevenness causing bumps may also occur.

### 2.5. Period of testing

In order to check whether the surface continues to conform to the texture and voids content or sound absorption requirements stipulated in this Annex, periodic testing of the surface shall be carried out at the following intervals:

- (a) For residual voids content (VC) or sound absorption ( $\alpha$ ):
  - when the surface is new;
  - if the surface meets the requirements when new, no further periodical testing is required. If it does not meet the requirement when it is new, it may do so later because surfaces tend to become clogged and compacted with time.
- (b) For texture depth (TD):
  - when the surface is new;
  - when the noise testing starts (*NB*: not before four weeks after laying);
  - then every twelve months.

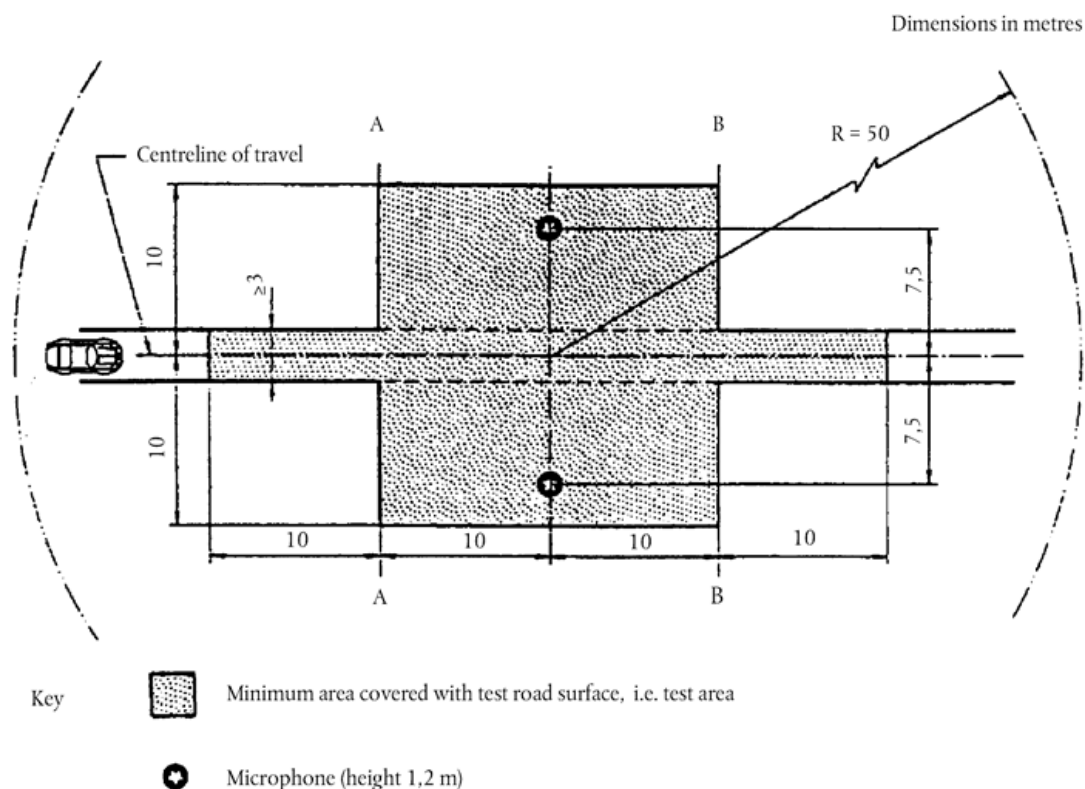
## 3. Test surface design

### 3.1. Area

When designing the test track layout it is important to ensure that, as a minimum requirement, the area traversed by the vehicles running through the test strip is covered with the specified test material with suitable margins for safe and practical driving. This will require that the width of the track is at least 3 m and the length of the track extends beyond lines AA and BB by at least 10 m at either end. Figure 1 shows a plan of a suitable test site and indicates the minimum area which shall be machine laid and machine compacted with the specified test surface material. According to Annex 5, Appendix 1, section 3.2., measurements have to be made on each side of the vehicle. This can be made either by measuring with two microphone locations (one on



each side of the track) and driving in one direction, or measuring with a microphone only on one side of the track but driving the vehicle in two directions. If the latter method is used, then there are no surface requirements on that side of the track where there is no microphone.



NOTE — There shall be no large acoustically reflective objects within this radius.

### 3.2. Design and preparation of the surface

#### 3.2.1. Basic design requirements

The test surface shall meet four design requirements:

- 3.2.1.1. It shall be a dense asphaltic concrete.
- 3.2.1.2. The maximum chipping size shall be 8 mm (tolerances allow from 6,3 mm to 10 mm).
- 3.2.1.3. The thickness of the wearing course shall be  $\geq 30$  mm.
- 3.2.1.4. The binder shall be a straight penetration grade bitumen without modification.

#### 3.2.2. Design guidelines

As a guide to the surface constructor, an aggregate grading curve which will give desired characteristics is shown in Figure 2. In addition, Table 1 gives some guidelines in order to obtain the desired texture and durability. The grading curve fits the following formula:

$$P (\% \text{ passing}) = 100 \cdot (d/d_{\max})^{1/2}$$

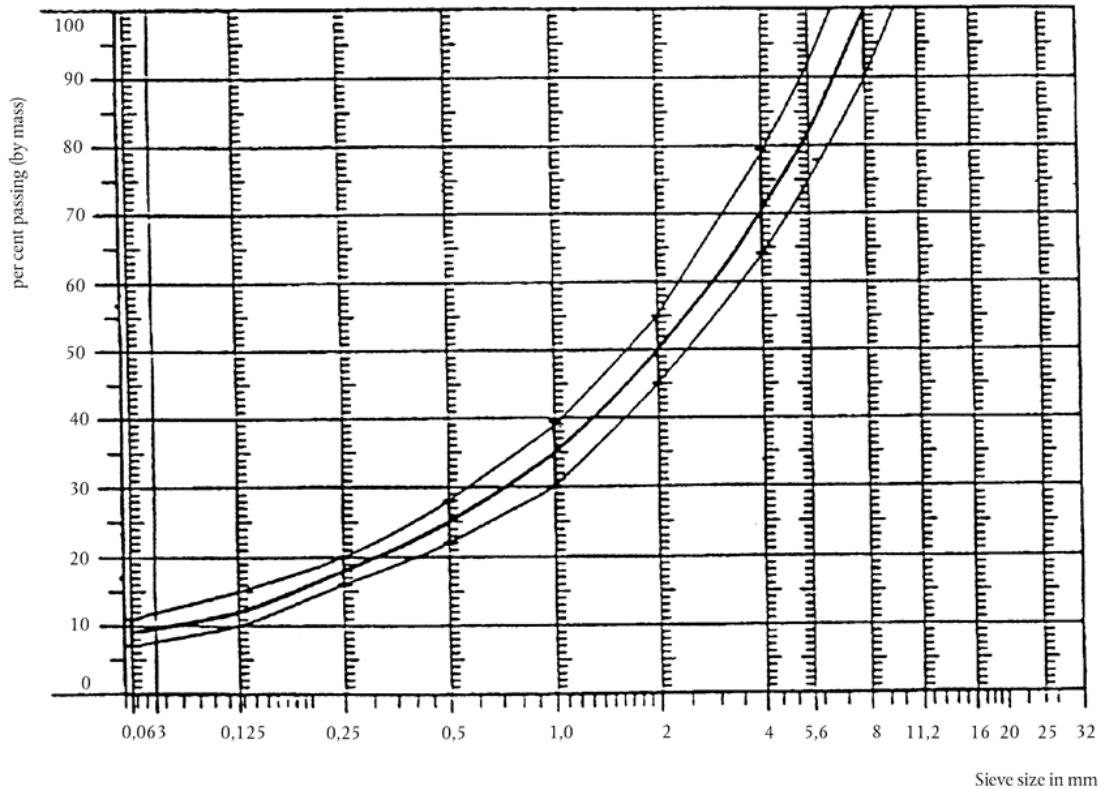
where:

- $d$  = square mesh sieve size, in mm
- $d_{\max}$  = 8 mm for the mean curve

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10 mm for the lower tolerance curve

6,3 mm for the upper tolerance curve



In addition to the above, the following recommendations are made:

- (a) The sand fraction ( $0,063 \text{ mm} < \text{square mesh sieve size} < 2 \text{ mm}$ ) shall include no more than 55 % natural sand and at least 45 % crushed sand.
- (b) The base and sub-base shall ensure a good stability and evenness, according to best road construction practice.
- (c) The chippings shall be crushed (100 % crushed faces) and of a material with a high resistance to crushing.
- (d) The chippings used in the mix shall be washed.
- (e) No extra chippings shall be added onto the surface.
- (f) The binder hardness expressed as PEN value shall be 40-60, 60-80 or even 80-100 depending on the climatic conditions of the country. The rule is that as hard a binder as possible shall be used, provided this is consistent with common practice.
- (g) The temperature of the mix before rolling shall be chosen so as to achieve by subsequent rolling the required voids content. In order to increase the probability of satisfying the specifications of sections 2.1. to 2.4. above, the compactness shall be studied not only by an appropriate choice of mixing temperature, but also by an appropriate number of passings and by the choice of compacting vehicle.

Table 1

| Design guidelines                                       | Target values          |                          | Tolerances |
|---|------------------------|--------------------------|------------|
|   | By total mass of mix   | By mass of the aggregate |            |
| <b>Mass of stones, square mesh sieve (SM) &gt; 2 mm</b> | 47,6 %                 | 50,5 %                   | ± 5        |
| <b>Mass of sand 0,063 &lt; SM &lt; 2 mm</b>             | 38,0 %                 | 40,2 %                   | ± 5        |
| <b>Mass of filler SM &lt; 0,063 mm</b>                  | 8,8%                   | 9,3%                     | ± 2        |
| <b>Mass of binder (bitumen)</b>                         | 5,8 %                  | N.A.                     | ± 0,5      |
| <b>Max. chipping size</b>                               | 8 mm                   |                          | 6,3 – 10   |
| <b>Binder hardness</b>                                  | (see para. 3.2.2. (f)) |                          |            |
| <b>Polished stone value (PSV)</b>                       | > 50                   |                          |            |
| <b>Compactness, relative to Marshall compactness</b>    | 98 %                   |                          |            |

#### 4. Test method

##### 4.1. Measurement of the residual voids content

For the purpose of this measurement, cores have to be taken from the track in at least four different positions which are equally distributed in the test area between lines AA and BB (see figure 1). In order to avoid non-homogeneity and unevenness in the wheel tracks, cores should not be taken in wheel tracks themselves, but close to them. Two cores (minimum) should be taken close to the wheel tracks and one core (minimum) should be taken approximately midway between the wheel tracks and each microphone location.

If there is a suspicion that the condition of homogeneity is not met (see section 2.4.), cores shall be taken from more locations within the test area.

The residual voids content has to be determined for each core, then the average value from all cores shall be calculated and compared with the requirement of section 2.1. In addition, no single core shall have a voids value which is higher than 10 %.

The test surface constructor is reminded of the problem which may arise when the test area is heated by pipes or electrical wires and cores must be taken from this area. Such installations must be carefully planned with respect to future core drilling locations. It is recommended to leave a few locations of size approximately 200 mm × 300 mm where there are no wires/pipes or where the latter are located deep enough in order not to be damaged by cores taken from the surface layer.

##### 4.2. Sound absorption coefficient

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The sound absorption coefficient (normal incidence) shall be measured by the impedance tube method using the procedure specified in ISO 10534-1: 'Acoustics — Determination of sound absorption coefficient and impedance by a tube method'<sup>(8)</sup>.

Regarding test specimens, the same requirements shall be followed as regarding the residual voids content (see section 4.1). The sound absorption shall be measured in the range between 400 Hz and 800 Hz and in the range between 800 Hz and 1 600 Hz (at least at the centre frequencies of third octave bands) and the maximum values shall be identified for both of these frequency ranges. Then these values, for all test cores, shall be averaged to constitute the final result.

#### 4.3. Volumetric macrotexture measurement

For the purpose of this standard, texture depth measurements shall be made on at least 10 positions evenly spaced along the wheel tracks of the test strip and the average value taken to compare with the specified minimum texture depth. See Standard ISO 10844:1994 for description of the procedure.

### 5. Stability in time and maintenance

#### 5.1. Age influence

In common with any other surfaces, it is expected that the tyre-road noise level measured on the test surface may increase slightly during the first 6 — 12 months after construction.

The surface will achieve its required characteristics not earlier than four weeks after construction. The influence of age on the noise from trucks is generally less than that from cars.

Stability over time is determined mainly by polishing and compaction by vehicles driving on the surface. It shall be periodically checked as stated in section 2.5.

#### 5.2. Maintenance of the surface

Loose debris or dust which could significantly reduce the effective texture depth must be removed from the surface. In countries with winter climates, salt is sometimes used for de-icing. Salt may alter the surface temporarily or even permanently in such a way as to increase noise and is therefore not recommended.

#### 5.3. Repaving the test area

If it is necessary to repave the test track, it is usually unnecessary to repave more than the test strip (of 3 m width in figure 1) where vehicles are driving, provided the test area outside the strip met the requirement of residual voids content or sound absorption when it was measured.

### 6. Documentation of the test surface and of tests performed on it

#### 6.1. Documentation of the test surface

The following data shall be given in a document describing the test surface:

6.1.1. The location of the test track.

6.1.2. Type of binder, binder hardness, type of aggregate, maximum theoretical density of the concrete (DR), thickness of the wearing course and grading curve determined from cores from the test track.

6.1.3. Method of compaction (e.g. type of roller, roller mass, number of passes).

- 6.1.4. Temperature of the mix, temperature of the ambient air and wind speed during laying of the surface.
- 6.1.5. Date when the surface was laid and contractor.
- 6.1.6. All or at least the latest test result, including:
  - 6.1.6.1. the residual voids content of each core;
  - 6.1.6.2. the locations in the test area from where the cores for voids measurements have been taken;
  - 6.1.6.3. the sound absorption coefficient of each core (if measured). Specify the results both for each core and each frequency range as well as the overall average;
  - 6.1.6.4. the locations in the test area from where the cores for absorption measurement have been taken;
  - 6.1.6.5. texture depth, including the number of tests and standard deviation;
  - 6.1.6.6. the institution responsible for tests according to sections 6.1.6.1. and 6.1.6.2. and the type of equipment used;
  - 6.1.6.7. date of the test(s) and date when the cores were taken from the test track.
- 6.2. Documentation of vehicle noise tests conducted on the surface

In the document describing the vehicle noise test(s) it shall be stated whether all the requirements of this standard were fulfilled or not. Reference shall be made to a document according to section 6.1. describing the results which verify this.]

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- (1) See explanatory figure, Appendix 1.
- (2) See explanatory figure, Appendix 1.
- (3) See explanatory figure, Appendix 1.
- (4) Equivalence factor from inches to mm is 25,4.
- (5) In the case of passenger car tyres intended for vehicles designed for a maximum speed greater than 240 km/h (Z rated tyres), until uniform test procedures have been agreed the manufacturer of the tyre must satisfy the technical service that his test procedure and results are acceptable.
- (6) In the case of commercial vehicle tyres intended for vehicles designed for a maximum speed greater than 150 km/h, until uniform test procedures have been agreed the manufacturer of the tyre must satisfy the technical service that his test procedure and results are acceptable.
- (7) [<sup>F3</sup>ISO 10844:1994 If a different test surface is defined by ISO, in the future, the reference standard will be amended accordingly.
- (8) To be published.]

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#### **Textual Amendments**

- F3** Inserted by [Directive 2001/43/EC of the European Parliament and of the Council of 27 June 2001 amending Council Directive 92/23/EEC relating to tyres for motor vehicles and their trailers and to their fitting.](#)