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Metric series for agricultural, forestry machines and construction tyres —

Part 1: Tyre designation, dimensions and marking, and tyre/rim coordination

Pneumatiques de la série millimétrique pour machines agricoles, engins forestiers et engins de construction —
Partie 1: Désignation dimensionnelle de pneumatiques, cotes, marquages et couples pneumatiques-jantes

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Subcommittee SC 5, *Agricultural tyres and rims*.

This fifth edition cancels and replaces the fourth edition (ISO 7867-1:2005), which has been technically revised. The main changes compared to the previous edition are as follows:

— the title has been revised to reflect the content of the document;

— the Scope now includes the design guides for tyres for forestry and construction applications with metric designation;

— definitions and markings for tyres for forestry and construction applications have been added;

— coefficients for the calculation of tyre dimensions have been added;

— data already contained in ISO 4223-1 have been removed and reference has been made to them;

— tables have been revised to reflect the latest evolution in regional regulations as well as industrial International Standards;

— data for rolling circumference index and speed radius index have been added.

A list of all parts in the ISO 7867 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Metric series for agricultural, forestry machines and construction tyres —

Part 1: Tyre designation, dimensions and marking, and tyre/rim coordination

1 Scope

This document establishes the tyre size designation, the dimensional calculation formulae, the markings and the tyre and rim coordination for the metric series of tyres primarily intended for use on agricultural and forestry tractors, machines, equipment and trailers and for construction machines.

It applies to diagonal, bias-belted and radial tyres mounted on 5° and 15° tapered rims.

NOTE Code designated series of:

— diagonal (ply rating marked) tyres for agricultural tractors and machines are specified in ISO 4251-1 and ISO 4251-2;

— radial (service description marked) tyres for agricultural tractor-drive-wheel tyres are specified in ISO 8664;

— tyres for logging and forestry machines are specified in ISO 18807[1)];

— tyres for construction/industrial tractors are specified in ISO 13442.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4223-1, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres*

ISO 4251-5, *Tyres (ply rating marked series) and rims for agricultural tractors and machines — Part 5: Logging and forestry service tyres*

ISO 7867-2, *Metric series of agricultural, forestry and construction tyres — Part 2: Tyres for agricultural tractors, machines and equipments - Service description and load ratings*

ISO 13442, *Tyres and rims for construction machines*

ISO 18807, *Tyres and rims for logging and forestry service*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4223-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

1) Under preparation. Stage at the moment of publication ISO/DIS 18807:2018.

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Tractor drive wheel tyres

3.1.1
standard metric tyres
tyres for use on drive wheels of agricultural machines (mainly tractors) engaged in surface work or linear cultivation in agricultural fields and transport or towing of equipment for such work

Note 1 to entry: The tyres are suitable for sustained high torque service with increased load at lower speeds (see details in ISO 7867-2).

3.1.2
IF tyres
tyres designed to operate at approximately 20 % higher rated load than *standard metric tyres* (3.1.1) at the same inflation pressure, but with no increased loads at lower speeds

3.1.3
VF tyres
tyres designed to operate at approximately 40 % higher rated load than *standard metric tyres* (3.1.1) at the same inflation pressure, but with no increased loads at lower speeds

3.2
tractor steering wheel tyres
tyres for use on non-driven steering wheels of agricultural machines (mainly tractors)

3.3
implement tyres
tyres for use on free rolling or driven wheels of agricultural machines, equipment or trailers

Note 1 to entry: The tyres are not suitable for sustained high torque service.

3.4
logging and forestry tyres
tyres designed to be fitted to machines or equipment used in logging and forestry applications

3.5
construction/industrial tractor tyres
tyres designed to be fitted on industrial tractors, backhoe loaders and other vehicles working in industrial or construction applications (e.g. loaders, excavators, etc.) or some agricultural vehicles (e.g. telehandlers)

4 Tyre size designation

4.1 General

The size designation and construction characteristics shall be indicated as follows:

Tyre type Prefix (if applicable)	Nominal section width	Nominal aspect ratio	Tyre construction code	Nominal rim diameter code	Tyre type suffix (if applicable)

4.2 Tyre type prefixes

"**IF**" identifies a tyre described in 3.1.2.

"**VF**" identifies a tyre described in 3.1.3.

4.3 Nominal section width

The nominal section width shall be expressed in millimetres and shall end with "0".

4.4 Nominal aspect ratio

The nominal aspect ratio (also known as tyre series) shall be a multiple of 5.

4.5 Tyre construction code

The tyre construction code shall be as follows:

— " **–** " or alternatively "**D**" for diagonal/bias construction;

— "**B**" for bias belted construction;

— "**R**" for radial construction.

4.6 Nominal rim diameter code

For tyres mounted on **5°** tapered rims, the nominal rim diameter shall be expressed by a code comprising 1 or 2 digits.

For tyres mounted on **15°** tapered rims, the nominal rim diameter shall be expressed by a code ending with ".5".

For details, refer to ISO 4223-1 and ISO 18804.

For tyres requiring new concepts of rims, for safety reasons especially concerning mounting, the code number shall be equal to the nominal rim diameter expressed by an integral number of millimetres, i.e. formed by 3 or 4 digits.

4.7 Tyre type suffixes

"**CHO**" identifies some standard tractor drive wheel metric tyres designed for cyclic harvesting (see details in ISO 7867-2).

"**CFO**" identifies a tractor drive wheel IF or VF tyre designed for cyclic field operations (see details in ISO 7867-2).

"**FRONT**" identifies a tyre for tractor steering wheels. It may be replaced by the tyre classification code "**F**" described in ISO 18805.

"**IMP**" identifies an implement tyre. It may be replaced by the inscription "**IMPLEMENT**" on the tyre sidewall.

"**LS**" identifies a tyre for forestry machines (see details in ISO 18807).

"**IND**" identifies a tyre for construction machines (see details in ISO 13442).

5 Marking

5.1 General

The marking on the tyre sidewalls shall comprise:

— the tyre size designation (see 5.2);

— the service description (see 5.3);

— any other additional information (see 5.4).

5.2 Tyre size designation

Metric tyres meeting the size and construction requirements of this document shall be marked on the sidewall as detailed in Clause 4 and shown in the examples below.

Tractor drive wheel tyres
480/70R38
710/75-26.5
IF600/70R30
IF800/60R32CFO

Tractor steering wheel tyre
210/55–15FRONT

Implement tyre
380/60–15IMP
460/65R22.5IMP

Forestry tyre
710/60–30.5LS

(see details in ISO 18807)

Construction/ industrial tractor tyre
400/80R24IND

(see details in ISO 13442)

5.3 Service description

The service description shall be indicated as follows:

Load index	**Speed symbol**

Actual values shall be as specified and explained in ISO 4251-5, ISO 7867-2, ISO 13442 and ISO 18807.

5.4 Additional information

5.4.1 For tubeless tyres, the marking "**TUBELESS**" shall be shown on the tyre.

5.4.2 For tube type tyres, the marking “TUBE TYPE” shall be shown on the tyre.

5.4.3 If a direction of rotation of the tyre is preferred, an arrow may be used to indicate that direction.

5.5 Tyre classification and nomenclature

A tyre classification code may be used to describe the primary field of application of the tyre as detailed in ISO 18805.

5.6 Tyre maximum pressure for bead seating pictogram

Conformity to some regional regulations requires the inscription "**xxx kPa MAX**" or "**xxx bar MAX**" inside a pictogram (see Figure 1) to notify the cold inflation pressure that shall not be exceeded for bead seating during tyre mounting.

The level of the seating pressure is determined by the tyre manufacturer.

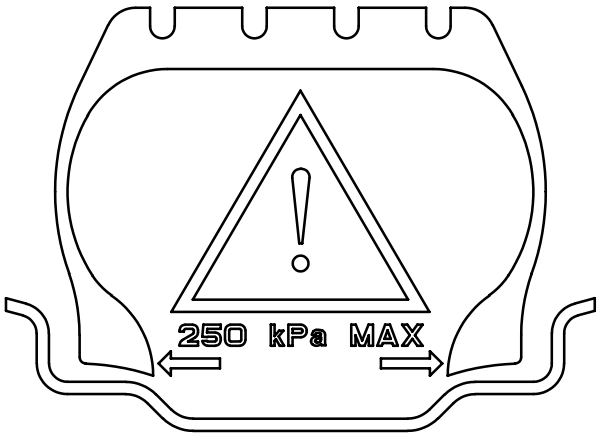

Figure 1 — Pictogram

6 Tyre dimensions

6.1 General

All calculated values of tyre dimensions (except rim dimensions) are to be rounded to the nearest whole number.

6.2 Calculation of "design tyre" dimensions

6.2.1 General

Design new tyre dimensions are used for tyre design purposes only.

6.2.2 Theoretical rim width, R_{th}

The theoretical rim width, R_{th}, is equal to the product of the nominal section width, S_N, and the rim/section ratio, K_1:

$$R_{th} = K_1 \times S_N$$

For factor K_1, see Table 1.

Table 1 — Coefficient K_1 for calculation of the theoretical rim width, R_{th}

Tyre type	Nominal aspect ratio A_R	Nominal section width S_N mm	K_1
Standard metric steering and drive wheel tyres on 5° tapered rims	105 – 40	≤ 950	0,80
	65 – 40	1 000; 1 050	0,85
		≥ 1 100	0,90
Tractor drive wheel IF and VF tyres on 5° tapered rims	105 – 80	320 to 900	0,85
	75 – 70	420 to 900	0,875
	65 – 40	420 to 1 250	0,90
Implement tyres on 5° tapered rims	100 – 90	≤ 280	0,70
	85 – 40	100 to 900	0,80
All tyres on 15° tapered rims	85 – 40	200 to 900	0,80
	35	500 to 900	0,85

6.2.3 Measuring rim width, R_m

The measuring rim width, R_m, is the rim width, A, nearest to the theoretical rim width, R_{th} (see Table B.1 for actual values of rim width A). The measuring rim width code is represented by the corresponding value in column 1 of Table B.1.

6.2.4 Design tyre section width, S

The design tyre section width, S, is the nominal section width, S_N, transferred from the theoretical rim, R_{th}, to the measuring rim width, R_m:

$$S = S_N + 0{,}4 \times (R_m - R_{th})$$

6.2.5 Design tyre section height, H

The design tyre section height, H, is equal to the product of the nominal section width, S_N, and the nominal aspect ratio, A_R, divided by 100:

$$H = S_N \times A_R/100$$

NOTE Some 70 series (A_R = 70) radial tyres for tractor drive wheels do not follow this rule. Their values for H, D_O and $D_{o,max}$ are shown in Table A.2.

6.2.6 Design tyre overall diameter, D_O

The design tyre overall diameter, D_O, is the sum of the nominal rim diameter, D_r, expressed in mm, and twice the tyre section height, H:

$$D_O = D_r + 2H$$

For the value of D_r, see the second column of Table B.2.

These values of D_O refer to tyres with regular tread pattern. For tyres with deep tread pattern, consult the tyre manufacturer.

6.3 Calculation of "minimum overall tyre dimensions"

6.3.1 Minimum overall width, W_{min}

The minimum overall width, W_{min}, is equal to the product of the design tyre section width, S, and the appropriate coefficient, c (see Table 2):

$$W_{min} = S \times c$$

6.3.2 Minimum overall diameter, $D_{0,min}$

The minimum overall diameter, $D_{0,min}$, is equal to the nominal rim diameter, D_r, expressed in mm, and twice the product of design tyre section height, H, and the appropriate coefficient, d (see Table 2):

$$D_{0,\,min} = D_r + 2 \times H \times d$$

6.4 Calculations of "maximum overall tyre dimensions in service"

6.4.1 General

These calculations are for use by vehicle manufacturers in designing for tyre clearance. Calculated values are to be rounded to the nearest integer.

6.4.2 Maximum overall width in service, W_{max}

The maximum overall width in service, W_{max}, is equal to the product of the design tyre section width, S, and the appropriate coefficient, a (see Table 2):

$$W_{max} = S \times a$$

It includes protective ribs, lettering, embellishments, manufacturing tolerances and growth due to service.

6.4.3 Maximum overall diameter in service, $D_{0,max}$

The maximum overall diameter in service, $D_{0,max}$, is equal to the nominal rim diameter, D_r, expressed in mm, plus twice the product of the design tyre section height, H, and the appropriate coefficient, b (see Table 2):

$$D_{0,\,max} = D_r + 2 \times H \times b$$

It includes manufacturing tolerances, the different types of tread patterns (see footnote to Table 2) and growth due to service.

6.5 Coefficients for calculation of tyre dimensions

The coefficients for the calculation of tyre dimensions shall be as given in Table 2.