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Metric series for agricultural, forestry machines and construction tyres —

Part 2: Load ratings for agricultural tyres

Pneumatiques de la série millimétrique pour machines agricoles, engins forestiers et engins de construction —
Partie 2: Capacités de charge de pneumatiques pour machines agricoles

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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 on 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 the following URL: 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 third edition cancels and replaces the second edition (ISO 7867-2:2005), which has been technically revised. It also incorporates the Amendment ISO 7867-2:2005/Amd 1:2010. The main changes compared to the previous edition are as follows:

— the title has been revised to reflect the content of the document, which applies only to agricultural tyres and not to forestry and construction applications, contained in other International Standards, as specified in the Scope;

— data 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.

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 2: Load ratings for agricultural tyres

1 Scope

This document establishes the service description, the tyre load ratings for basic and special applications and reference inflation pressure for the metric series of tyres primarily intended for agricultural tractors, machines, equipment and their trailers.

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

NOTE The service description, the tyre load ratings for basic and special applications and reference inflation pressure for the metric series of:

— 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 4223-1:2017, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres*

ISO 7867-1, *Metric series of agricultural, forestry and construction tyres — Tyre size designation, dimensions, marking and tyre/rim coordination*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4223-1 and ISO 7867-1 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

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

3.1
cyclic loading application
condition that applies when the load on the tyre cycles is between the unloaded and the fully loaded condition

Note 1 to entry: The vehicle shall be unloaded before off-field transport.

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

3.2
hillside combine
combine intended for service on slopes above 11° (20 %) lateral slope

3.3
low torque
condition that applies when the primary torque involved is to propel the vehicle

Note 1 to entry: Vehicles pulling carts or trailers are considered to be operating in a low torque mode when operating on slopes up to 11° (20 %) lateral slope.

3.4
high and sustained torque
condition that occurs when high continuous tractive effort is applied to the drawbar or hitch

Note 1 to entry: Vehicles equipped with injectors, or any other ground engaging attachment (e.g. ploughing) or dragging objects are considered to be operating in a high and sustained torque mode. Vehicles pulling carts or trailers are also considered to be operating in a high torque mode when operating on slopes greater than 11° (20 %) lateral slope.

3.5
road transport
movement of a vehicle from one location to another under transfer conditions

Note 1 to entry: This movement occurs during transportation of equipment from site to site.

3.6
drive wheel tyre
tyre designed primarily for the equipment of driven axles of agricultural machinery, excluding sustained high torque services

Note 1 to entry: “Drive wheel tyre” is the generic term used in this document for implement drive wheel or traction tyres.

3.7
free rolling tyre
tyre designed for the equipment of non-driven (trailed) axles of agricultural machinery or trailers

Note 1 to entry: “Free rolling tyre” is the generic term used in this document for implement free rolling or trailer tyres.

3.8
mixed applications tyre
tyre designed to be fitted to either driven or non-driven (trailed) axles of agricultural machinery or trailers

Note 1 to entry: “Mixed applications tyre” is the generic term used in this document for implement mixed application tyres.

4 Service description

4.1 General

The service description shall be indicated as follows:

Load index *Speed symbol*

4.2 Load index

The load index is a numerical code associated with the maximum load a tyre can carry at the speed indicated by its speed symbol under service conditions specified by the tyre manufacturer.

The correlation between load indices and tyre load carrying capacities shall be as given in ISO 4223-1:2017, Table A.1.

4.3 Speed symbol

The speed category symbol is a symbol indicating the speed at which the tyre can carry the load corresponding to its load index under service conditions specified by the tyre manufacturer.

For metric series tyres, the following speed symbols apply.

Speed symbol	Speed km/h
A6	30
A8	40
B	50
D	65

4.4 Application symbol

Application symbols shall be added to the service description of implement tyres.

Free rolling service  or **Drive wheel** service  or **Mixed** service 

SOURCE Reference [7], reproduced with the permission of the authors

EXAMPLE

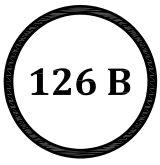
119 A6 

131 A6 

4.5 Supplementary service description

Tractor drive wheel tyres may also be marked with an additional service description, indicated within a circle, to identify a special type of service (load rating and speed category) for which the tyre size is also allowed in addition to the applicable load variation with speed.

EXAMPLE



or

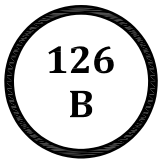


Table 1 is not applicable to the supplementary service description (see examples of load ratings in 5.2.2.4).

5 Tyre load ratings

5.1 Basic tyre load

Basic tyre load is the tyre load-carrying capacity indicated by the tyre's load index at the reference speed indicated by the tyre's speed symbol in the principal service description.

When used as duals, tyre loads shall be reduced to 88 % of the basic tyre load.

When used as triples, tyre loads shall be reduced to 82 % of the basic tyre load.

For basic tyre loads and reference inflation pressures of some existing tyre sizes, see:

— standard tractor drive wheel radial tyres, given in Table A.1;

— standard tractor drive wheel diagonal tyres, given in Table A.2;

— IF tractor drive wheel radial tyres, given in Table A.3;

— implement tyres with speed symbol A6 or A8 in Table B.1;

— implement tyres for mixed applications with speed symbol D in Table B.2.

5.2 Tyre applications at service speeds other than the reference speed

5.2.1 General

The rim/wheel manufacturer shall be consulted for confirmation of the suitability of the rim/wheel for the intended service.

5.2.2 Tractor drive wheel tyres

5.2.2.1 General

For applications with low torque, including road transport, the load/speed relationship is given in Table 1.

The tyre manufacturer concerned shall be consulted for the actual pressure to be used when applying the load/speed relationship given in Table 1, especially for service speeds 10 km/h and below.

Table 1 — Load/speed relationship for tractor drive wheel tyres

Service speed km/h	Maximum tyre load for various speed symbols %					
	Standard metric drive wheel tyres			IF and VF tyres		
	A8	B	D	A8	B	D
0	230	230	230	100	100	100
5	170	170	170	100	100	100
10	150	150	150	100	100	100
15	134	134	134	100	100	100
20	123	123	123	100	100	100
25	111	111	118,5	100	100	100
30	107	107	115	100	100	100
35	103	103	112	100	100	100
40	100	100	109,5	100	100	100

Table 1 *(continued)*

Service speed km/h	Maximum tyre load for various speed symbols %					
	Standard metric drive wheel tyres			IF and VF tyres		
	A8	B	D	A8	B	D
45	96	100	107	96	100	100
50	91	100	105	91	100	100
55			103		—	100
60			101,5		—	100
65			100		—	100
70			91		—	91

5.2.2.2 Standard metric drive wheel tyre for field application with high and sustained torque

For this application, the values shown for service speed 30 km/h in Table 1 apply.

5.2.2.3 Standard metric drive wheel tyre application on combine harvesters

5.2.2.3.1 General

On combine harvesters in cyclic loading application, except hillside combines, load and inflation pressure increases are shown in Table 2. This load increase shall include all possible field and user modifications that increase the vehicle mass and shall apply only to load increases which occur during the harvesting process. For hill-side operations over 11° (20 %) slope, only the basic tyre loads are permitted.

Table 2 — Load adjustments for combine harvester cyclic loading applications

Service speed km/h	Maximum tyre load %
10	170 %
15	155 %
Inflation pressure increase	up to +25 % (i.e. +40 kPa to +80 kPa)

For tyre load and inflation pressure recommendations for combine harvesters in transport service, the tyre manufacturer shall be consulted.

The combine harvester shall be unloaded before transport outside the field.

5.2.2.3.2 Standard metric CHO drive wheel tyre application on combine harvesters

For standard metric tyres marked with the suffix CHO (cyclic harvesting operations), loads and pressures in Table 3 apply.

Table 3 — Load adjustments for CHO tyres in cyclic loading applications

Service speed km/h	Maximum tyre load %
10	180 %
15	165 %
Inflation pressure increase	none

5.2.2.4 Standard metric drive wheel tyre marked with additional service description

Examples of tyre load carrying capacities at various service speeds for tyres marked with a supplementary service description are given in Table 4.

Table 4 — Load/speed relationship as a function of the service description markings — Example: tyre size 480/70R38

Service speed km/h	Service description	
	145 A8	145 A8 (145 B)
	Tyre load carrying capacities kg	
25	3 220	3 220
30	3 105	3 105
35	2 985	2 985
40	2 900	2 900
45	2 785	2 900
50	2 640	2 900

5.2.2.5 IF and VF metric drive wheel tyres in cyclic loading applications

No increase in load or inflation pressure is permitted when an "IF" or "VF" tyre is used in combine service.

5.2.2.5.1 IF-CFO drive wheel tyre application in cyclic loading applications

For tyres marked with the suffix CFO (cyclic field operations), loads and pressures in Table 5 apply.

Table 5 — Load adjustments for IF-CFO tyres in cyclic loading applications

Service speed km/h	Maximum tyre load %
15	155 %
30	130 %
Inflation pressure increase	none

5.2.2.6 IF and VF metric drive wheel tyre application on tractors with front end loader

In cyclic service with a front end loader at speeds up to 10 km/h, a load up to 140 % of the basic tyre loads is permitted with an inflation pressure increase of 80 kPa. Cyclic service is defined as an intermittent load transport over a maximum distance of 1 km with minimum torque. In unloaded mode, the tyre load shall not exceed the basic load capacity.

5.2.3 Tractor steering wheel tyres

5.2.3.1 General

For applications at service speeds other than that indicated by the tyre service description, the load/speed relationship is given in Table 6.

The tyre manufacturer concerned shall be consulted for the actual pressure to be used when applying the load/speed relationship given in Table 6.

Table 6 — Load/speed relationship for steering wheel tyres with speed symbol A6 or A8

Service speed km/h	Maximum tyre load for various speed symbols	
	%	
	A6	A8
10	150	167
15	143	150
20	135	139
25	115	128
30	100	111
35	90	104
40	80	100
45	—	93
50	—	—

5.2.3.2 Tractor steering wheel tyres application on tractors with front end loader

In cyclic service with a front end loader at speeds up to 10 km/h, a load up to 200 % of the basic tyre loads is permitted. In unloaded mode, the tyre load shall not exceed the basic load capacity.

5.2.4 Implement tyres

5.2.4.1 General

For applications at speeds other than that indicated by the tyre service description, including road transport, the load/speed relationship is given in Table 7.

The tyre manufacturer concerned shall be consulted for the actual pressure to be used when applying the load/speed relationship given in Table 7.

Table 7 — Load/speed relationships for implement tyres

Service speed	Maximum tyre load for various speed symbols			
	%			
(km/h)	A6	A8	B	D
0	a	a		
10	129	140	158	180
15	121	133	132	173
20	114	126	126	165
25	107	119	119	158
30	100	112	112	151
35	95	105	110	144
40	90	100	106	136
45	—	95	102	129
50	—	90	100	121
55	—	—	—	114

a 165 in case of load capacities for free rolling wheels or 235 in case of load capacities for drive wheels.

Table 7 *(continued)*

Service speed	Maximum tyre load for various speed symbols			
	%			
(km/h)	**A6**	**A8**	**B**	**D**
60	—	—	—	107
65	—	—	—	100
70	—	—	—	91

[a] 165 in case of load capacities for free rolling wheels or 235 in case of load capacities for drive wheels.

5.2.4.2 Implement tyres with cyclic high load variation

When tyres marked with speed symbol A6 or A8 equip vehicles subject to haulage cyclic high load variations excluding transport application on long distances (i.e. vehicles used on round trips from field to farm) where, on one way, the vehicle is empty and, on the other way, the gross vehicle mass exceeds two times the mass of the empty vehicle, inclusive of the driver, if any, the reference load capacities, obtained by applying load variations shown in Table 7, may be increased by 20 % in case of free rolling wheels, or by 43 % in case of drive wheels, respectively.

Reference inflation pressures shall be increased at least by 20 %, but the tyre manufacturer shall be consulted for the actual pressure to be used in practice.

5.2.4.3 Implement tyres on non-driven steering wheels

When fitted on free rolling steering wheels of self-propelled agricultural equipment, tyre load capacities are 80 % of the loads for free-rolling applications. Inflation pressure should be increased in accordance with tyre manufacturers' recommendations.

6 Reference inflation pressures

The following reference inflation pressures are recommended for basic tyre loads of different ranges of agriculture tyres (metric series).

— Tractor drive wheel and steering wheel tyres: 100 kPa, 120 kPa, 160 kPa, 200 kPa, 240 kPa, 280 kPa, 320 kPa, 360 kPa, 400 kPa, 440 kPa, 480 kPa, 520 kPa.

— Implement tyres: 80 kPa, 120 kPa, 160 kPa, 200 kPa, 240 kPa, 280 kPa, 320 kPa, 360 kPa, 400 kPa, 450 kPa, 500 kPa, 550 kPa, 600 kPa.

NOTE These reference inflation pressures are for the basic tyre loads. Operating pressures can be different depending on the actual load on the tyre, the operating speed and the service conditions.