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**All terrain (AT) tyres and rims — Symbol  
marked pneumatic tyres on 5 degrees  
tapered rims — Designation, dimension,  
marking and load ratings**

*Pneumatiques et jantes tout terrain — Pneumatiques marqués par un  
symbole pour jantes à repos de talon conique à 5 degrés —  
Désignation, dimensions, marquage et coefficients de charge*

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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.

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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.

ISO 29802 was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves*, Subcommittee SC 10, *Cycle, moped, motorcycle tyres and rims*.

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# All terrain (AT) tyres and rims — Symbol marked pneumatic tyres on 5 degrees tapered rims — Designation, dimension, marking and load ratings

## 1 Scope

This International Standard specifies the designations, dimensions, markings and load ratings of pneumatic tyres primarily intended for all terrain vehicles (ATV). It also specifies the designation, marking and contours of rims.

The tyres are based on the following parameters:

- a) speeds not exceeding 130 km/h (speed symbol M);
- b) fitted to (AT) 5° tapered drop centre rims;
- c) nominal rim diameter codes of 7 to 14 inclusive.

## 2 Normative references

The following referenced documents are indispensable for the application 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 31-0:1992, *Quantities and units — Part 0: General principles*

ISO 3877-1, *Tyres, valves and tubes — List of equivalent terms — Part 1: Tyres*

ISO 4223-1:2002, *Definitions of some terms used in the tyre industry — Part 1: Pneumatic tyres*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4223-1, ISO 3877-1 and the following apply.

### 3.1

#### **NHS**

**not for highway service**

marking that identifies tyres for off-road applications

## 4 Tyre size designations

### 4.1 Dimensional and constructional characteristics

#### 4.1.1 General

The characteristics shall be indicated as follows:

	Prefix	Nominal overall diameter code		Nominal section width code	Tyre construction code	Nominal rim diameter code
<b>Example</b>	<b>AT</b>	<b>23</b>	<b>×</b>	<b>10</b>	<b>-</b>	<b>10</b>

#### 4.1.2 Prefix

AT (all terrain) identifies tyres and rims designated for service on all terrain vehicles (ATV).

#### 4.1.3 Nominal overall diameter code

The code shall be as given in Table 1.

**Table 1 — Nominal overall diameter code**

Nominal overall diameter code	Design tyre overall diameter, $D_o$ mm
16	406
18	457
19	483
20	508
21	533
22	559
23	584
24	610
25	635
26	660
27	686

#### 4.1.4 Nominal section width code

The nominal section width of the tyre shall be indicated by means of a code with steps of 1 unit starting from 6.

#### 4.1.5 Tyre construction code

The tyre construction code shall be as follows:

- *D* or “-” (a dash) for diagonal ply construction;
- *R* for radial ply construction.

#### 4.1.6 Nominal rim diameter code

The code shall be as given in Table 2.

**Table 2 — Nominal rim diameter code**

Nominal rim diameter code	Nominal rim diameter, <i>D<sub>r</sub></i> mm
7	178
8	203
9	229
10	254
11	279
12	305
13	330
14	356

## 4.2 Service condition

### 4.2.1 General

The tyre shall be marked with a symbol and a service condition description. In the case of tyres restricted to off-road service and marked “NHS”, the marking of the service condition description is optional.

### 4.2.2 Symbol of reference inflation pressure

Symbols shall be used to identify the reference inflation pressure given in Table 3.

**Table 3 — Reference inflation pressures**

Symbol	Inflation pressure kPa
☆	25
☆☆	35
☆☆☆	45

**4.2.3 Service condition description**

**4.2.3.1 General**

The service condition description shall be indicated as follows:

Load index                      Speed symbol                      (example 35 F)

**4.2.3.2 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 Annex A of ISO 4223-1:2002.

**4.2.3.3 Speed symbol**

The speed symbol shall be as given in Table 4. The speed symbol or speed category indicates the reference speed defined as the speed at which the tyre can carry the load corresponding to its load index under the specified service description.

**Table 4 — Correlation between speed symbol and speed category**

Speed symbol	Speed category km/h
F <sup>a</sup>	80 <sup>a</sup>
<sup>a</sup> The reference speed for tyre load identification of all terrain tyres shall be 80 km/h, i.e. speed symbol F.	

**4.3 Other service characteristics**

**4.3.1** The word “TUBELESS” shall be used to characterize tyres that can be used without a tube.

**4.3.2** Specific indications, if required, may be added to show, for example, the preferred direction of rotation, indicated by an arrow.

**5 Marking**

The marking shall consist of:

- a) the designation of the dimensional and constructional characteristics;
- b) service condition description;
- c) other service characteristics.

The location of the marking of the service condition description (load index and speed symbol) and the symbol identifying the reference inflation pressure shall be distinct but in the vicinity of the marking of the dimensional and constructional characteristics.

No location is specified for the markings related to other service characteristics (see 4.3).

EXAMPLE      AT 20 × 10 – 9    ☆☆    34 F

The characteristics of a tyre with the above markings are as follows:

- AT: tyre designated for service intended for service on all terrain vehicles (ATV);
- 20: nominal overall diameter code;
- 10: nominal section width code;
- - : diagonal ply construction;
- 9 : nominal rim diameter code;
- ☆☆: symbol to identify a reference inflation pressure of 35 kPa;
- 34: load index (LI) corresponding to a tyre load capacity of 118 kg;
- F: speed symbol corresponding to a speed category of 80 km/h.

## 6 Tyre dimensions

### 6.1 General

The formula-derived values for design tyre dimensions shall be rounded to the nearest millimetre. For rounding of values, see ISO 31-0:1992, Annex B.

### 6.2 Calculation of design tyre dimensions

#### 6.2.1 Theoretical rim width, $R_{th}$

The theoretical rim width,  $R_{th}$ , is equal to the product of the nominal section width,  $S_n$ , (see Table 8) and to the rim/section ratio,  $K_1$ , where the value of  $K_1$  is 0,8 rounded to the nearest standardized rim width code.

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

#### 6.2.2 Measuring rim width, $R_m$

Measuring rim width,  $R_m$ , enables one to select the nearest standardized rim width code from  $R_{th}$  (see Table 8).

#### 6.2.3 Design tyre section width, $S$

The design tyre section width,  $S$ , is given in Table 8.

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

#### 6.2.4 Design tyre overall diameter, $D_o$

The design tyre overall diameter,  $D_o$ , is given in Table 1.

#### 6.2.5 Design tyre section height, $H$

The design tyre section height,  $H$ , is equal to half the value given by the design tyre overall diameter,  $D_o$ , minus the nominal rim diameter,  $D_r$ .

$$H = \frac{(D_o - D_r)}{2}$$

For the values of  $D_r$  to be used, see Table 2.

### 6.3 Calculation of “maximum overall tyre dimensions”

#### 6.3.1 General

This calculation is for use by vehicle manufacturers in designing for tyre clearance.

These dimensions shall be calculated with the coefficients (see Table 5) appropriate to the tyre nominal section width code and the design tyre section height.

#### 6.3.2 Maximum tyre overall width, $W_{\max}$

The maximum tyre overall width,  $W_{\max}$ , is equal to the product of the design tyre section width,  $S$ , and the appropriate coefficient  $a$ :

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

where

$a = 1,07$  for nominal section width code  $\leq 10$ ;

$a = 1,06$  for nominal section width code  $\geq 11$ .

#### 6.3.3 Maximum tyre overall diameter, $D_{o,\max}$

The maximum tyre overall diameter,  $D_{o,\max}$ , is equal to the nominal rim diameter,  $D_r$ , (see Table 2) plus twice the product of the design tyre section height,  $H$ , and the appropriate coefficient, rounded to the nearest millimetre:

$$D_{o,\max} = D_r + (2 \times H \times b)$$

where  $b = 1,06$ .

### 6.4 Calculation of “maximum overall grown tyre dimensions”

#### 6.4.1 General

These dimensions shall be calculated with the coefficients (see Table 5) appropriate to the tyre construction and maximum tyre dimensions.

Table 5 — Coefficients for calculation of maximum grown overall tyre dimensions in service

Tyre construction	Speed km/h	Coefficients	
		<i>c</i>	<i>d</i>
Diagonal/radial	60	1,09	1,07
	80		1,09
	100		1,11
	>100	a	a
<sup>a</sup> Consult tyre manufacturer.			

#### 6.4.2 Maximum grown tyre overall width in service, $W_G$

The maximum grown tyre overall width in service,  $W_G$ , is equal to the product of the design tyre section width,  $S$ , and the appropriate coefficient,  $c$ , referring to the vehicle design maximum speed capability (see Table 5):

$$W_G = S \times c$$

#### 6.4.3 Maximum dynamic tyre overall diameter in service, $D_{o,dyn}$

The maximum tyre overall diameter in service,  $D_{o,dyn}$ , is equal to the product of the maximum overall diameter in service,  $D_{o,max}$ , and the appropriate coefficient,  $d$ , referring to the vehicle design maximum speed capability (see Table 5):

$$D_{o,dyn} = D_{o,max} \times d$$

### 6.5 Calculation of “minimum tyre dimensions”

#### 6.5.1 General

These dimensions shall be calculated with the coefficients appropriate to the design tyre section width and design tyre section height.

#### 6.5.2 Minimum tyre section width, $S_{min}$

The minimum tyre section width,  $S_{min}$ , is equal to the product of the design tyre section width,  $S$ , and the appropriate coefficient:

$$S_{min} = S \times 0,95$$

#### 6.5.3 Minimum tyre overall diameter, $D_{o,min}$

The minimum tyre overall diameter,  $D_{o,min}$ , is equal to the nominal rim diameter,  $D_r$ , plus twice the product of the design tyre section height,  $H$ , and the appropriate coefficient:

$$D_{o,min} = D_r + (2 \times H \times 0,94)$$

**6.6 Range of approved rim widths**

The range of approved rim widths is calculated as the product of the nominal section width,  $S_n$ , and the coefficients shown in Table 6 rounded to the nearest standardized rim width code.

**Table 6 — Approved rim widths**

Approved rims	
Minimum	Maximum
0,65	0,85

**7 Method of measurement of tyre dimensions**

Before being measured, the tyre shall be mounted on its measuring rim, see Table 8, inflated to the recommended pressure, see Table 7, and allowed to stand for a minimum of 24 h at normal room temperature, after which the inflation pressure shall be readjusted to the original value.

**Table 7 — Inflation pressures to measure dimensions**

Symbol	Inflation pressure kPa
☆	20
☆☆	30
☆☆☆	40

**Table 8 — Tyre dimensions and approved rims**

Dimensions in millimetres

Nominal section width code $S_n$	Measuring rim width code $R_m$	Design section width $S$	Maximum grown tyre overall width in service $W_G$	Approved rim width code	
				minimum	maximum
6	5.00	154	168	4.0 AT	5.0 AT
7	5.50	177	193	4.5 AT	6.0 AT
8	6.50	204	222	5.0 AT	7.0 AT
9	7.00	227	247	6.0 AT	7.5 AT
10	8.00	254	277	6.5 AT	8.5 AT
11	9.00	281	306	7.0 AT	9.5 AT
12	9.50	304	331	8.0 AT	10.0 AT
13	10.50	331	361	8.5 AT	11.0 AT

## 8 Reference load-carrying capacity

**8.1** The 100 % reference load-carrying capacity is the load corresponding to the load index marked on the tyre.

**8.2** The load-carrying capacities are calculated at inflation pressure of 25 kPa for the basic load version, and rounded to the nearest load index.

For different inflation pressures, the load capacities can be derived from Table 9.

**Table 9 — Tyre load capacities versus inflation pressures of 25 kPa for tyres marked with speed symbol *F***

kPa	15	17,5	20	22,5	25	27,5	30	32,5	35	37,5	40	42,5	45
LI step	-10	-7	-4	-2	0	+2	+4	+5	+7	+8	+10	+11	+12
NOTE If the load/inflation calculation results in a load index less than 0 (45 kg), use 3 % for each load index increment. Round to the nearest 0,1 kg.													

## 9 Load ratings

**9.1** The permissible loads for AT tyres are based on their application according to vehicle type and speed capability and shall be as given in Table 10.

NOTE The data given in Table 10 might be reconsidered in the light of additional field experience.

**9.2** For 100 % reference, see Clause 8.

**9.3** Calculated loads shall be rounded to the nearest kilogram.

## 10 Inflation pressures

Operating cold inflation pressures should be agreed between tyre and vehicle manufacturers taking into account not only the tyre load-carrying capacity (TLCC), but also the operating conditions, the maximum speed, the position of the tyre on the vehicle, service conditions and the construction and characteristics of the vehicle and operating surface.

Cold inflation pressure means the pressure taken with the tyre at ambient temperature; it does not include any pressure build-up due to tyre usage.

