



## Safety and utilisation advice

### ■ Introduction:

Tyres are the only point of contact between the vehicle and the road. Therefore, users must ensure that they preserve the condition and performance of their tyres.

To do this, Michelin recommends that users comply with the following safety recommendations and guidelines.

### ■ How to read a tyre?

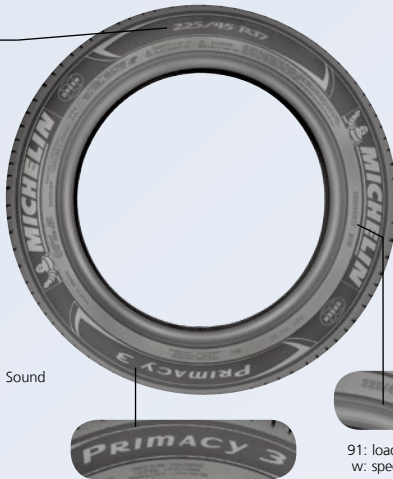


225: tyre width in mm  
45: tyre series (ratio of height with width of H/S section: 0.45)  
R: structure: radial  
17: inside diameter in inches

Mark of compliance with the ECE30 ruling with approval number



Mark of compliance (Noise): 2001/43/EC directive



Sound

Name of the range

91: load capacity index  
w: speed index

DOT:  
department of transportation

Week and year of manufacture



Factory code

Size code

Optional code

## Definitions of other markings:

**Reinf** : "Reinforced": tyres with an IC greater than the size.  
**Extra Load** : New marking with the same meaning as Reinf.

**XSE** : "X" reference to radial technology  
**"S"** safety  
**"E"** economy

N0 - N1	C1	AO	A
N2 - N3	★	MO1	
K1 - K2	MO	RO1	



**3 PMSF**  
 = 3 Peak Mountain Snow Flake  
 = The 3-Peak Mountain with Snowflake symbol Additional marking on M+S tyres indicating they are designed for severe snow conditions.

## Specific manufacturer markings



The GREEN X marking on the sidewalls of a MICHELIN passenger car, Commercial, 4x4 tyre is the guarantee that this tyre offers a level of energy efficiency which is one of the best on the market. With this marking, Michelin undertakes to reduce the fuel consumption of vehicles and, thus, reduce CO<sub>2</sub> emissions.

## Choice of tyre

- Tyre choice must comply with the applicable local legislation and be in compliance with the original equipment of the vehicle, as defined by its manufacturer (tyre size, load and speed indices, tyre structure, tyre category, etc.).
- Moreover, it is necessary to take account of the conditions in which the tyre will be used so that its performance meets the user's expectations.
- In the event of a change from the original equipment tyre specification, it must be ensured that the solution complies with the applicable local legislation, is suited to the vehicle, its conditions of use and its manufacturer's recommendations. Note that in some European countries, a vehicle modified in this way must receive authorisation from the relevant authorities.
- Before a second-hand or pre-used tyre is fitted on a vehicle, we recommend that a tyre professional carries out a thorough examination to ensure that it is safe and legal for the tyre to be put into service.
- It is strongly advised that two tyres of the same tread pattern design should be used on the same axle. Note that in some European countries, this is mandatory.
- It is recommended that tyres of similar tread depths are fitted on the same axle.
- When replacing two tyres, it is recommended that the new tyres or the least worn tyres should be mounted on the rear axle.

Do not operate the tyre at an unsuitable pressure, at a speed higher than its rating, or at a load higher than its rating.

- Certain excessive or abnormal vehicle suspension geometry settings may have an adverse effect on the tyre's performance.
- Inappropriate use of the tyre, or wrong tyre choice can contribute to premature wear of certain vehicle mechanical components.

- On 4x4 vehicles, Michelin strongly recommends that tyres are used in identical sets of four (same size, make, pattern, load index/speed symbol). An exception is where the vehicle was originally fitted with different tyre sizes front to rear. The vehicle manufacturer's recommendations should also be followed.
- A temporary spare tyre must not be used on a long term basis, and must only be used in accordance with the tyre and vehicle manufacturer's instructions (distances and speeds etc). Care should be taken when driving a vehicle with a temporary spare fitted, as the vehicle's handling may be different or unusual.
- For tyres designed to run flat under certain conditions, respect the operating instructions given by the tyre manufacturer.
- Follow the vehicle manufacturer's tyre inflation pressure recommendations.

## ■ Use of tyres:

- Never use the tyre beyond the limits of the technical specifications for which it has been approved.
- Certain excessive or abnormal geometrical settings for the vehicle may have an effect on the tyre's performance.
- Poor use or wrong choice of tyre can also contribute to premature wearing of certain mechanical parts.

### New tyres to the REAR:

When replacing just two tyres, Michelin recommends that the new or least worn tyres are fitted to the rear axle for improved vehicle control and safety. This advice applies to front and rear wheel drive vehicles fitted with the same tyre sizes front and rear. Ensure that the tyre inflation pressures are readjusted to comply with the vehicle manufacturer's recommendations.

### Specific cases:

#### 4 wheel drive vehicles:

Tyre selection and fitment

Select tyres to suit the vehicle and its use.

Fit vehicles with 4 identical tyres (same size, make, pattern, load index and speed symbol). An exception is where the vehicle was originally fitted with different sizes front and rear.

Mixing different brands of tyre or even different patterns of the same brand can result in the front and rear axles being forced to try and rotate at different speeds, potentially causing mechanical stresses in the transmission system, especially the central differential.

Comply with the vehicle manufacturer's advice. This often covers subjects such as tyre specifications, tyre permutation, winter fitments, fitting snow chains, etc. When fitting Cold Weather tyres, they should be fitted on all 4 wheels.

## Conversions

When the surfaces on which a 4x4 is to be used change, consider a change of tyre type to suit the conditions of use (on-road, multi-purpose, off-road, winter).

Ensure that the conversion complies with all the necessary legal requirements (overall diameter, tyre projection, load index, tyre inflation pressures, etc.).

Consult Michelin to verify tyre sizes with equivalent overall diameters and suitable load/speed capacity.

## Motorhomes:

Motorhomes require tyres that are adapted to their conditions of use. In 2003, the ETRTO (European Tyre and Rim Technical Organisation) changed the standard, as well as its recommendations relating to motorhome tyres, and now says «CP-type tyres have been designed to cater for the higher loads imposed by motor-caravans», and that «it is strongly recommended that motor-caravans are only fitted with CP-tyres».

At replacement, Michelin strongly recommends the fitting of CP tyres to vehicles originally homologated and fitted with CP tyres.

The load on the tyre must not exceed its maximum limit for any reason, i.e. the load rating must be respected.

The ETRTO also states that where CP tyres are used on the rear axle (single fitment), they must be inflated to a pressure of 5.5 bar instead of the normal pressure of 4.75 bar for example.

- MICHELIN CP marked tyres are therefore specially designed to be driven at an inflation pressure of 5.5 bar (550 kPa) This higher pressure improves road holding and increases resistance to the challenging driving and usage conditions encountered by motorhomes, especially with regard to loads (occasional static and/or dynamic overload associated with this type of vehicle; considerable rear overhang, load imbalance, high centre of gravity due to highly positioned loads) and long-term periods of disuse.

Fitting tyres that are not adapted to this type of use could lead to:

- poor handling (roll, pitch, yaw, difficulties in road holding)
- in difficult or severe conditions, premature deterioration of tyre components, such as the crown, which could lead to a rapid deflation.

In use: check and adjust if necessary tyre inflation pressures monthly and before any long journey. **Under-inflation can be dangerous: for example, for the tyre size 225/70R15 Camping CP, an under-inflation of 0.5 bar/7.2psi (11%) is equivalent to an overload of around 100 kg per tyre.**

**Overloading (even temporarily) or poor vehicle load distribution can cause premature deterioration of vehicle components and/or tyres and thereby cause damage to persons or property”.**

- If a change of tyre size is foreseen, a tyre of an equivalent overall diameter should be used and the original load index and speed symbol should be respected (speed and load ratings must be equal to or greater than the original tyres). It is recommended that a tyre professional is consulted for this operation.
- If the vehicle is parked for a long time, do not leave the tyres under inflated, and always make sure that the inflation pressures are correct before next using the vehicle. Protect tyres from UV radiation, e.g. from sunlight, and use axle stands to avoid tyre contact with cold winter surfaces (concrete, stone ...).
- Have the condition of the tread and sidewall checked regularly (for impact damage, cuts, cracking etc...) as well as the condition of the wheels and valves, by a professional.

NOTE: For tyre inflation pressures above 4.5 bar (450 kPa), metal valves appropriate to the pressures must be used.



## ■ Fitting

### Introduction

- Comply with appropriate procedures and safety guidelines for tyre fitting, removal, inflation and balancing.
- Correct tyre fitting is not only designed to protect personnel and material, but also allows the tyre to operate properly.
- Incorrect tyre fitting can cause damage to the tyre, to the vehicle or to personnel (serious or even fatal injuries may result).
- It is therefore essential that tyre fitting, removal, inflation and balancing must be performed with appropriate equipment and undertaken by appropriately qualified personnel.
- If a trainee carries out any part of the tyre fitting procedure, he/she must always be closely supervised by a qualified tyre professional.
- In all cases, it is essential to refer to the technical instructions of the tyre manufacturer, vehicle manufacturer and wheel manufacturer, as well as the user manual for the tyre-fitting machinery or equipment.

### General precautions

- appropriate clothing must be worn,
- the appropriate operating procedures must be followed,
- the vehicle must be stationary, fully immobile, with its engine switched off (use the handbrake, blocks, axle stands, etc).

### Precautions for removing the wheel from the vehicle

- In the case of dual (twinned) fitments or if the rim shows evidence of damage, the tyres must be deflated before removal of the fitted assembly.
- Ensure that the wheel and tyre are cool enough to allow safe removal.
- Comply with the vehicle manufacturer's recommendations and instructions.

### Precautions for fitting

- Check that the external and internal condition of the tyre and the wheel and its components are in good condition and suitable for service prior to fitting.
- Check that the tyre and wheel are of the correct dimensions, are compatible with each other, and are compatible with the vehicle and its conditions of use.
- Take account of the fitting instructions and warnings on the tyre sidewalls (direction of rotation or sense of fitting for example).
- Rubber valves must be systematically replaced in tubeless applications.
- Metal valves must be checked for condition and air tightness. Replace the seals or valve where necessary.
- After fitting the wheel to the vehicle, it is important to use a suitable calibrated torque wrench and installation method to tighten the fixings to the torque defined by the manufacturer of the vehicle

### Precautions for inflation

- Correct tyre inflation pressure is an essential factor, not only for optimal tyre performance but also for SAFETY.
- Correct tyre inflation pressure is necessary for good vehicle handling (road holding and braking) as well as for maintaining tyre condition.
- Only use appropriate inflation equipment which must be fitted with a pressure limiter. Personnel must stand as far away as practically possible from the fitted assembly during inflation.

### Tyre operating inflation pressure

- Comply with the tyre inflation pressure(s) prescribed by the vehicle manufacturer. These can be found in the vehicle handbook, and/or on the vehicle itself (door, door frame, fuel filler cap etc).
- Under-inflation or over-inflation can significantly affect the vehicle's handling. (see Vehicle checks and maintenance - Tyre inflation pressure).

### Balancing

- If the fitted assembly is not correctly balanced (dynamically), it may induce vibrations into the vehicle during service.
- It is therefore essential to balance all four wheels for a comfortable drive and for sustained vehicle and tyre performance.
- For effective balancing, machines must have a centring system matching that used on the vehicle hub and must be calibrated in accordance with the manufacturer's instructions. These two points are critical to the quality of the operation performed and are often at the root of faulty balancing which manifests itself by persistent vibration felt in the vehicle in service.

Lack of or faulty balancing manifests itself in the form of vibrations, within various speed ranges. Wheel balancing is therefore absolutely essential for driving comfort and continued vehicle and tyre performance.



## ■ Storage and maintenance

### General conditions

Tyres should be stored:

- In a ventilated, dry and temperate area, protected from direct sunlight, bad weather and humidity.
- Away from any chemicals, solvents or hydrocarbons capable of altering the nature of the rubber.
- Away from anything capable of cutting or penetrating the rubber (e.g. sharp metal, wood).
- Away from any naked flame, source of heat (e.g. radiators) or any substance capable of causing sparks, electrical or ozone discharge (batteries, generators, electric welding equipment etc). Welding or heat treatments must never be performed on or near any fitted wheel and tyre assembly. The use of appropriate protective gloves is recommended for handling tyres.

Avoid crushing the tyres under objects.

Accessories should be stored in their original packaging on surfaces that do not present any danger of cutting, tearing or perforation.

In all cases tyres and tyre accessories must be handled with care and using appropriate equipment and materials that will not cause any harm.

The use of appropriate protective clothing and gloves is recommended when handling tyres.

### Short-term storage

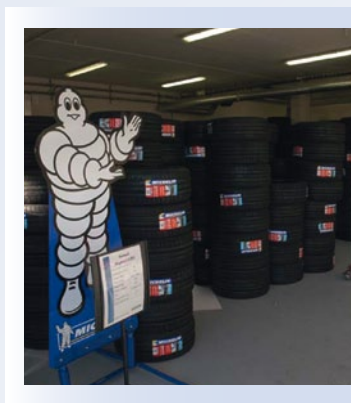
#### (up to 4 weeks):

Tyres can be stacked one on top of the other, preferably on pallets.

The height of the stacks should not exceed 1.2 metres.

After 4 weeks, the tyres should be restacked, reversing the order of the tyres.

When fitted on rims, tyres should be stored inflated, in an upright position or in a single layer on racks.





### Long-term storage

Tyres should be stored upright on racks with at least 10 cm clearance above the floor.

To avoid distortion they should be rotated slightly once a month.



## ■ Vehicle checks and maintenance

### General recommendations

Ensure that the vehicle is stationary before any inspection.

- Tyres must be inspected regularly in order to detect any unusual wear and potential damage.
- Wheel fixing torque must be checked in accordance with the vehicle manufacturer's recommendations.
- Any perforations, cuts or visible distortion of the tread, sidewalls or bead area must be the subject of a thorough (internal/external) examination of the tyre by a tyre professional. Any damage to the rim must also be assessed by an appropriate expert.

Any abnormal occurrence such as vibration, noise or pulling, must be checked immediately by yourself and by a tyre professional.

In all circumstances, do not put back into operation any tyres that exhibit damage, such as deformed bead, visible bead wire or ply, rubber separation, visible cable cords, damage from hydrocarbon or corrosive materials, marbling or abrasion of the interior rubber resulting from any running at insufficient pressure or if there is any doubt as to their condition or suitability for service. Any tyre showing clear signs of wear or ageing (cracking or crazing) must be examined by a tyre professional and a decision made about its suitability for service even if it has not been run or is rarely used (for example: spare tyre, tyres fitted to trailers, motorhomes, or caravans).

Each time the vehicle is inspected, check that the valve cap and its rubber seal are in good condition. If in doubt, replace the cap with a new one.



## Checking for wear

- Checking for wear must always be carried out at several points across and around the tyre.
- This check can be carried out using a tyre tread depth gauge or by referencing against the tread wear indicators in the tread grooves. The tread wear indicators can be found in the main grooves in line with the Michelin Man symbols on the tyre shoulders.
- If the legal limit for wear has been reached (see below), the tyre must be removed and replaced.
- A tyre professional must be consulted if there is abnormal wear or a difference in wear rate or wear pattern between two tyres on the same axle.

### What does the law have to say about tyre wear?

The minimum legal depth is 1.6mm throughout a continuous band comprising the central three-quarters of the breadth of tread and around the entire outer circumference of the tyre. For more information see the section “**Construction and Use Regulations**”, in particular Regulation 27, in this book, or contact our Technical Services Group.

## Tyre inflation pressure

- Check tyre pressures using a calibrated pressure gauge (including the spare tyre) at least monthly, and before any long trip.
- Correct the tyre pressures if they do not correspond to the pressures recommended by the vehicle manufacturer for the conditions of use. Ideally, check pressures when the tyres are cold; this means that they have not been used in the last 2 hours, or they have covered less than 2 miles at low speeds.
- Any tyre not in this “cold” condition is considered to be “hot”.

If the tyres are “hot” when they are checked:

- Use a pressure four to five psi (0.3 bar) higher than the pressures recommended by the vehicle manufacturer.
- Never deflate a “hot” tyre, even if the pressure is above the recommended level.
- Re-check the pressures when the tyres are cold.

## Under-Inflated Tyres

- The use of a vehicle that has tyres with insufficient inflation pressure could lead to an abnormal increase in their operational temperature and may cause damage to internal components of the tyre. This damage is irreversible and may eventually lead to the sudden rapid deflation of the tyre. The consequences of running with insufficient tyre inflation pressure are not necessarily immediate or visible and may appear even after the tyre pressure has been corrected.
- Insufficient tyre inflation pressure also strongly increases the risk of aquaplaning.



## Over-Inflated Tyres

- Over inflating a tyre can cause rapid and irregular wear to its tread and result in increased susceptibility to impacts (tread damage, rupture of the carcass, etc.).

## General Advice

- Inflation using nitrogen does not dispense with the need to frequently check the tyre pressure.
- Use an accurate calibrated tyre pressure gauge to check inflation pressures. The minor cost of such a gauge can quickly be saved back in increased tyre life and fuel economy from accurate tyre pressures.

## Repair

All tyre repairs must be carried out by a trained and qualified professional and to the British Standard BSAU159f.

- Repairs should be preceded as a matter of course by a detailed inspection of the tyre by the professional.
- A tyre that has been run under-inflated or flat may have suffered irreversible damage and only an exhaustive check of the interior of the tyre will enable a diagnosis of whether or not the tyre can be put back into use. Removal of the tyre from the wheel is therefore essential in order to assess its actual condition, if a repair is possible and the type of repair required.
- In the event of a puncture, injection of a sealant through the valve (instant puncture sealant, etc.) can only be a partial and temporary solution and does not comply with the requirement of the British Standard for tyre repairs. These products may be incompatible with the tyre, wheel, valve, pressure sensor, etc. It is essential to follow the manufacturer's recommendations. In this case, a tyre professional must be consulted to check the tyre and, if possible, make a permanent repair.



## ■ Product life

Tyres are made from different types of materials and rubber-based components, whose properties are essential to the tyre's correct functionality.

These properties evolve over time. For each tyre, this evolution depends upon many factors such as climate, storage conditions, and conditions of use (load, speed, inflation pressure, road damage, etc.) to which the tyre is subjected during its life.

These ageing factors vary so much that it is impossible to predict the life of the tyre with any accuracy.

This is why, in addition to regular user checks and maintenance, it is recommended to have tyres regularly checked by a qualified professional, who will determine whether the tyre is fit to continue in service.

This inspection must be carried out at least once a year for tyres which have been in use for 5 years or more.

Users should also be aware of any change in performance such as increased air loss, noise or vibration which could mean that tyres need to be removed from service to maintain vehicle safety.

The older a tyre the greater the chance that it will need to be replaced due to the service-related evolution or other conditions found upon inspection or detected during use. While most tyres will need replacement before they achieve 10 years, it is recommended that tyres in service 10 years or more from the date of manufacture, including the spare, should be replaced with new tyres as a simple precaution.

This applies to tyres which appear serviceable and have not worn to the legal limit.

For tyres fitted as original equipment, follow the vehicle manufacturer's tyre replacement recommendations when specified (but the age of these tyres should not exceed 10 years).

The tyre's date of manufacture can be found in a code on the sidewall which normally begins with the letters DOT and ends with the week and year of manufacture. For example a DOT code ending in "2204" indicates a tyre made in the 22nd week of 2004.



**Non-compliance with these recommendations may harm the vehicle's performance and may cause handling problems and/or malfunction of the tyre that may put the safety of the user and third parties at risk.**

**Michelin may in no way be held responsible for damage that may occur as a result of and/or when being used contrary to its instructions.**