

Welcome to the third lesson on Continental EM tires. You now know about the vehicles and their areas of application. In this lesson you will find out all about the technology and the EM tires themselves. The following questions will show you precisely what you will find out about here:

- How is the EM tire constructed?
- What determines the load-carrying capacity of the tire?
- What is the purpose of the air in the tire?
- How is the EM tire marked?
- How is the rim of the EM tire marked?
- Which Continental EM tires are there?

This lesson will make you a technical specialist on EM tires

Continental EM tires are manufactured exclusively in a **cross-ply design**. This exclusive production has advantages for graders, among other vehicles, although we will come back to that later on. Let's now look at the structure of the tire.

### Carcass

The carcass comprises **several rubberised textile cord plies**, whose **cords** run diagonally to the direction of motion, crosswise from ply to ply. In order to protect against exterior damage, there are also

**intermediate textile plies** incorporated into the area of the tread. There are also **intermediate steel plies** used in special cases. In tubeless tires, a **rubber layer** is heat-embossed onto the inside of the carcass. This inner lining seals the interior, which is formed by the tire and rim.

### Running strip

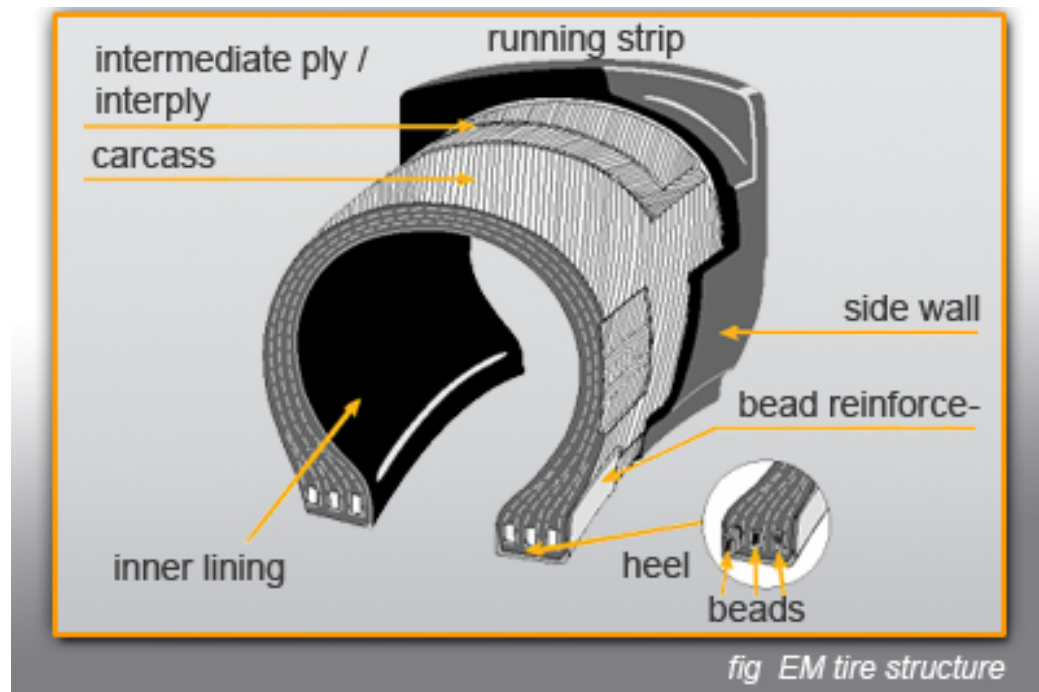
The running strip consists of a **wear-resistant rubber mixture**, which is adapted according to its **operating conditions**. It contains the profile, which is adapted to suit its operating conditions. It is in direct contact with the ground underneath and transmits the forces which occur between the vehicle and the ground.

### Side wall

The side wall consists of a **highly flexible rubber mixture** for the protection of the carcass into which the text is heat-embossed.

### Heel

The heel ensures that the tire sits on the wheel rim. The bead is **reinforced by steel cores** around which the ends of the cord plies are wrapped.

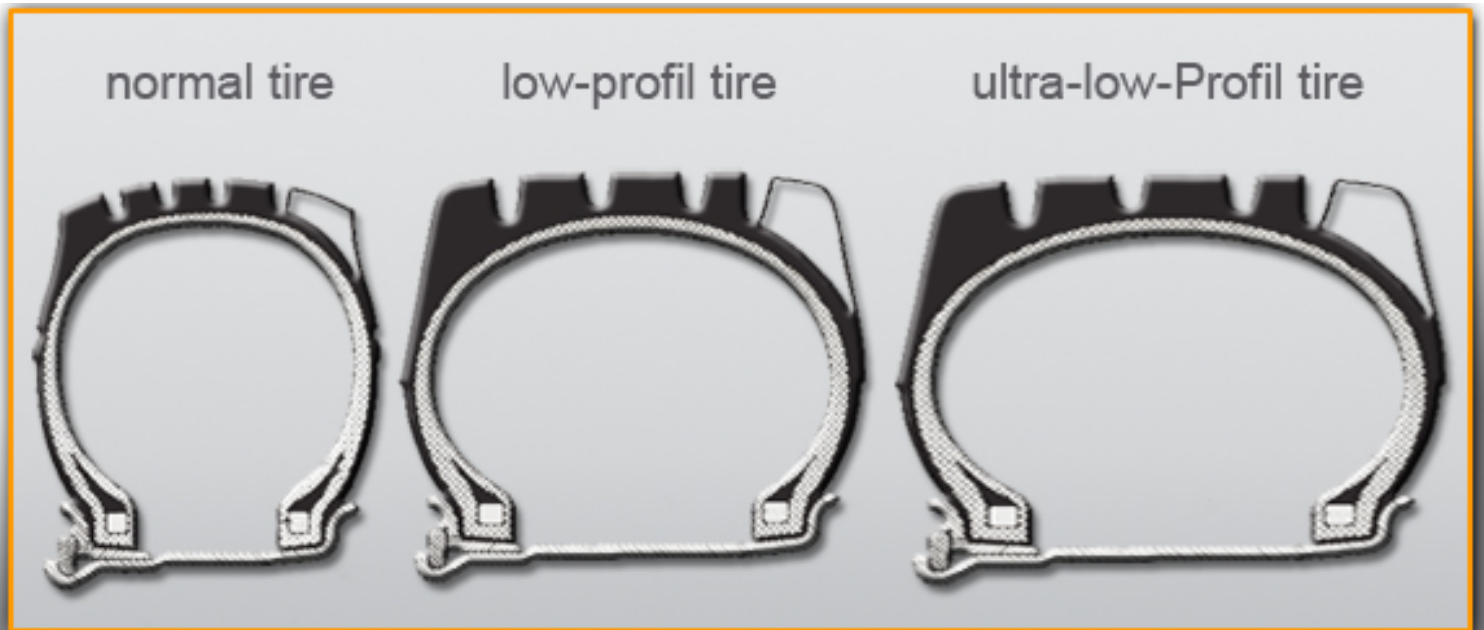


The load-carrying capacity of the pneumatic tire is determined by the **air volume it contains**. This is also true of EM tires.

The more air a tire contains, the greater its load-carrying capacity.

EM tires also have **two ways** of accommodating a large volume of air:

- **by high filling pressure**
- **by larger tire dimensions**



*fig. normal tire, low-profil tire, ultra-low-profile tire*

The cross-section ratio is the ratio of the **cross-section height to the cross-section width**. The usual cross-section ratios of Continental ET tires are **45% — 100%**. Large volume tires with low air pressure offer optimum traction on **unsecured roadways**. The low air pressure gives these tires a lower surface pressure and so do not sink as far into the ground.

The advantages of wide and super-wide tires:

- **greater lateral stability thanks to the wider tread**
- **more suited to driving on soft ground because they do not sink as far in**
- **More tread rubber makes them last longer**
- **Greater comfort through greater volumes of air and lower air pressure**

The air pressure, which has to perform the following tasks, is closely connected to the **load-carrying capacity**:

- to carry the load of the vehicle
- to transmit driving, braking and transverse forces
- to absorb unevenness

A characteristic feature of Continental EM tires is that they have the largest air pressure range **2.0 — 10.0 bar** among commercial vehicles. The image below shows how dependent load-carrying capacity is on air pressure.

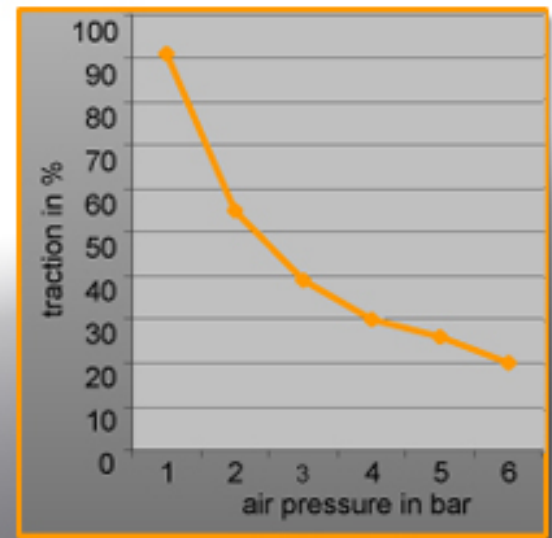
The **effect** of various air pressure values on traction and load-carrying capacity varies according to the type of use:

### On-road use – high filling pressure

High air pressure which is adjusted to the **vehicle's axle load** and **speed** ensures reduced flexing action on **secured roadways**. As a result, the tire does not heat up too much.

### Off-road use – low filling pressure

Low air pressure within the **tire specifications** increases the **support surface** and subsequently off-road traction. Tractive resistance is also lower off-road. The diagram is a good illustration of how dependent traction is on air pressure.



*fig. tractive power vs. inflation pressure*

### Alternative fills (liquid ballast and dry ballast)

To increase traction and stability in special cases, the tires can be filled with **water and/or an anti-freeze solution**. The fill level must not **exceed 75%** of the volume. This increases the weight of an EM tire by **500 kg**. This means that the whole vehicle is **2000 kg** heavier altogether. **Special valves** and **filling equipment** are required for filling with liquid ballast.

Tires can be filled with dry ballast to ensure **absolute protection against breakdowns**. The plastic **polyurethane** is used for this. It hardens within 24 hours. Dry ballast is favoured on landfill sites.

As a general rule, the tire markings show the following information:

Important data included in the tire markings are:

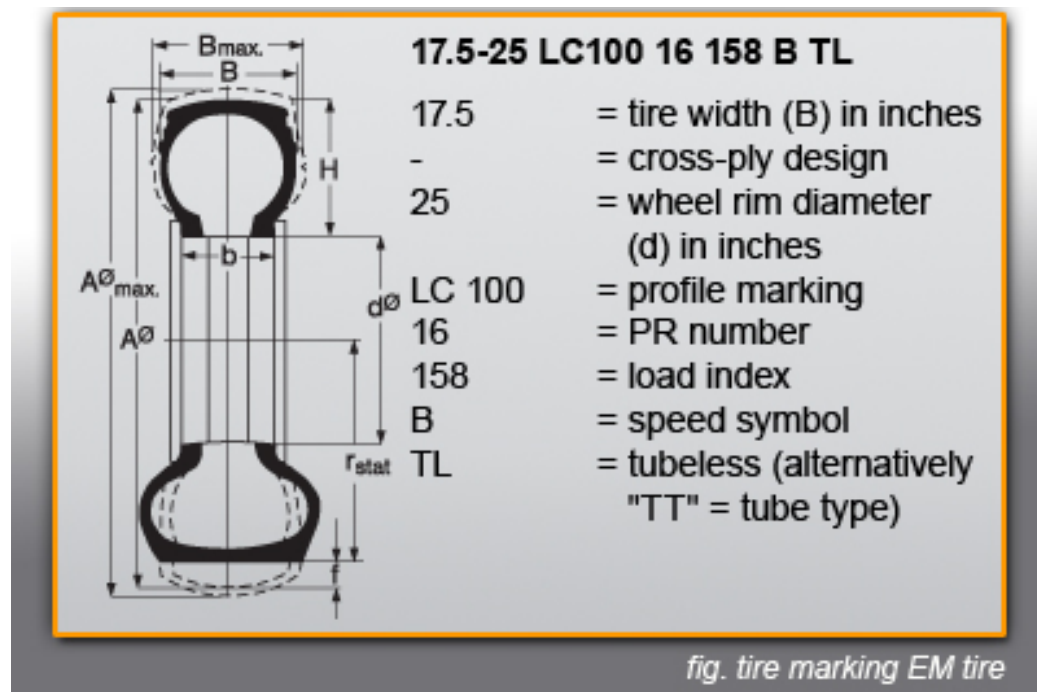
- **tire width (B)**
- **rim diameter (d)**

This is supplemented by the **carcass strength**, which is indicated by the **PR number**. PR stands for ply rating and indicates the number of layers. Due to new materials, this no longer corresponds to the actual number of layers, but instead

refers to the tire's **resistance to puncture**. Today the PR number is replaced by the **load index** and the **speed symbol**.

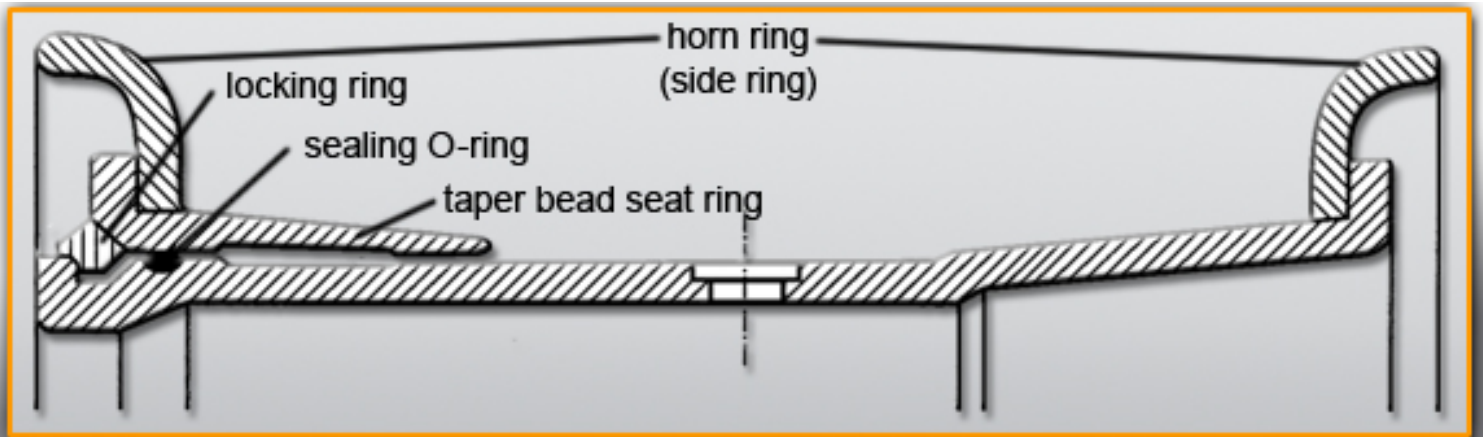
The load-carrying capacity is indicated as **load index** at an assigned reference speed.

Reference speed is indicated as a **speed symbol (GSY)**.



*fig. tire marking EM tire*

There are two important types of rims for EM tires. Firstly, the **tapered bead seat rim** conforming to DIN 7848.

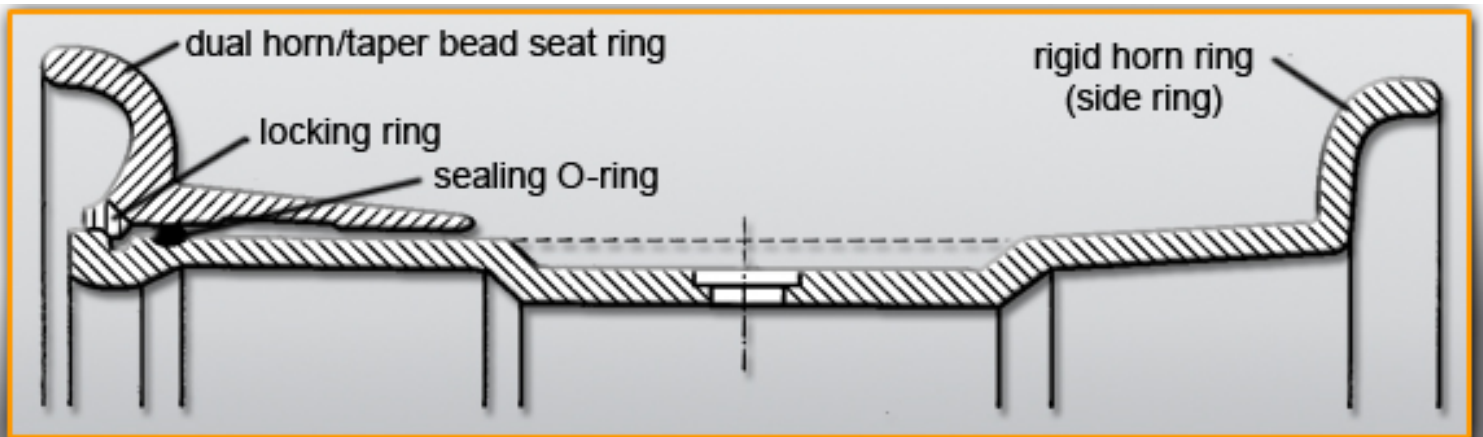


*fig. tapered bead seat rim*

It is a 5-piece rim and a O-ring for tubeless EM tires. Using the **11.25-25/2.0** rims as an example, the following information can be read:

**11.25** = rim width  
**-** = flat base  
**25** = rim diameter  
**2.0** = flange height

Secondly, the **semi-drop centre** rim conforming to DIN 7826.



*fig. semi-drop-center-rim*

This is a 3-piece rim and a O-ring for tubeless tires. The rim **8.00 TG-24 SDC** contains the following information:

**8.00** = rim width  
**SDC** = semi-drop centre  
**TG** = flange design  
**24** = rim diameter

It is very apparent from the images that the O-ring is made of rubber. This is used to seal the rim for tubeless tires.



Continental EM tires have the following characteristics:

- **high vehicle stability**
- **good self-cleaning on loamy ground**
- **good protection of the side wall from tears**

Moreover, the name also contains international codes which are used for classification. Meanings of the codes:

<b>E (Earthmover)</b>	<b>Transport machine (dumper, scraper)</b>
<b>L (Loader)</b>	<b>Working machine (wheel loader, dozer)</b>
<b>G (Graders)</b>	<b>Graders</b>
<b>C (Compactor)</b>	<b>Compactors</b>

<b>1</b>	<b>Rib profile (100% profile depth)</b>	<b>1:1 profile tread pattern</b>
<b>2</b>	<b>Traction profile (100% profile depth)</b>	<b>1:1 profile tread pattern</b>
<b>3</b>	<b>Rock-use profile (100% profile depth)</b>	<b>2:1 profile tread pattern</b>
<b>4</b>	<b>Deep rock-use profile (150% profile depth)</b>	<b>2:1 profile tread pattern</b>
<b>5</b>	<b>Extra deep rock-use profile (250% profile depth)</b>	<b>2:1 profile tread pattern</b>
<b>7</b>	<b>Flotation (Sand-use / 60% profile deep)</b>	<b>4:1 profile tread pattern</b>
<b>S</b>	<b>Addition (smooth/no profile)</b>	

**A distinction is made between the impact of different inflation pressures on traction and the impact on load-carrying capacity of a tire for which types of applications?**

road service

haulage service

off-road service

steel works service

- **The EM tire consists of the carcass (cross-ply), bead with core, running surface and side wall.**
- **The load-carrying capacity and traction of a tire are determined by the air volume it contains.**
- **The air pressure has a significant effect on the tire's properties.**
- **When used on-road, increased air pressure means reduced rolling resistance.**
- **The hallmarks of Continental EM tires are high vehicle stability, good self-cleaning on loamy ground and good protection of the side wall from tears.**