Welcome to the third and probably the most interesting lesson. This section aims to give you an understanding of Continental MPT tires. This lesson should answer the following questions for you:

- **How is the MPT tire constructed?**
- **What determines the load-carrying capacity of the tire?**
- **What functions does air in the tire have?**
- **How is the MPT tire marked?**
- **How is the rim of MPT tires marked?**
- **Which Continental MPT tires are there?**

The following knowledge informs you about the technology of MPT tires.

As you already know there are two tire structures:

- **Radial tires**
- **Cross-ply tire**

As shown in the illustration, cross-ply and radial-ply tires have a different structure.

The most important components of both tires are:

Abb. radial tire

Carcass

The carcass is the **essential** component of the load-bearing tire body. It ensures the **cohesion of the tire** and gives it **strength**. A distinction is made between the radial-ply and cross ply design.

Radial carcass

Here the cord plys run diagonally to the running direction from heel to heel. A **steel cord belt** for reinforcement is located between carcass and running surface, the steel cord plys of which lie crosswise to the running direction in the apex angle. This ensures that the tire is subjected to much **longer friction** and, thanks to the **soft side wall**, is much more **comfortable**.

Cross-ply carcass

It consists of several rubberised textile cord plys. The cords are at an angle of about 40° to the running direction, crosswise from ply to ply. This results in a **stronger side wall** and thus gives **increased protection**. The wear of the tire is, however, substantially greater than in the case of the radial-ply tire.

Running strip

The running strip contains the profile, consists of a wear-resistant rubber mixture and is located on the carcass. It transmits forces that occur between vehicle and road. Special rubber compounds can make the tires particularly suitable for use in winter.

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 consists of a **steel wire core** around which the ends of the carcass cord are put. It ensures that **the tire sits safely on the wheel rim**.

As in all tires, the **air volume** in an MPT tire determines its **load-carrying capacity**. There are two possibilities for accommodating a greater air volume:

- **by high filling pressur**
- **by large tire dimensions**

The cross-section ratio is the ratio of the cross-section height to the cross-section width. The current cross-section ratios of MPT tires are **55% – 80%**. 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.

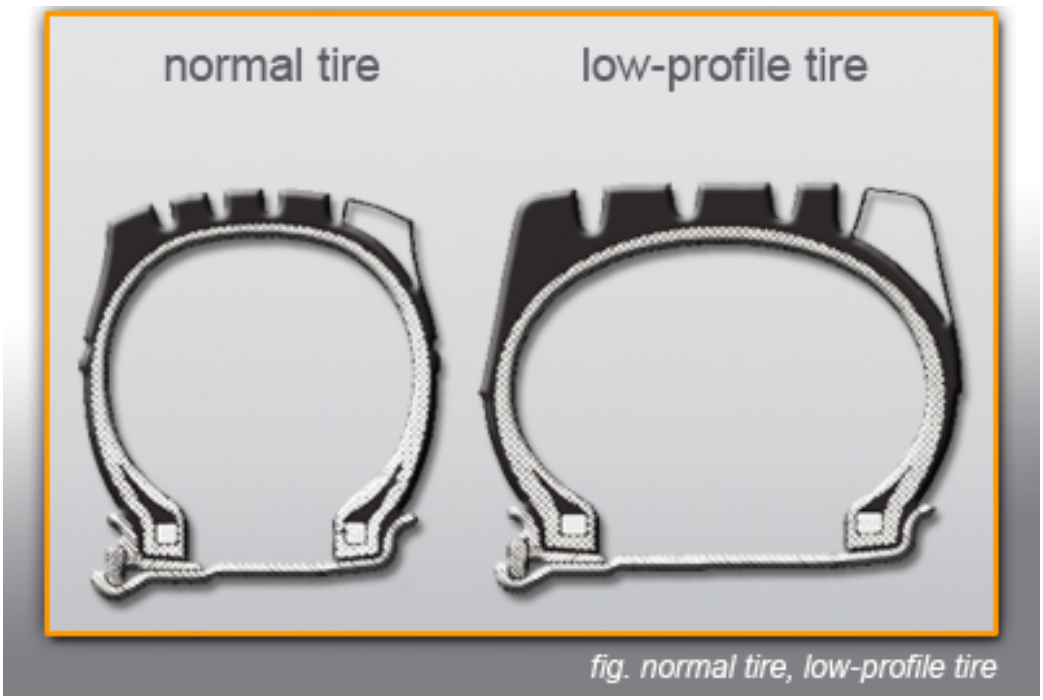

fig. normal tire, low-profile tire

The following tables show the load-carrying capacity range for various speeds and special cases.

Maximum speed in km/h (determined by vehicle design)	Approved load capacity in % of the nominal load capacity according to Load Index for reference speed			
	E (70 km/h)	G (90 km/h)	J (100 km/h)	K (110 km/h)
120	–	–	88	93
115	–	–	93	97
110	–	87	96	100
107,5	–	89,5	97	100
105	–	92	98	100
102,5	–	93,5	99	100
100	–	95	100	100
95	–	97,5	101	101
90	83	100	102	102
85	88	103	103	103
75	96,5	105,5	105,5	105,5
70	100	107	107	107
65	105	108,5	108,5	108,5
60	110	110	110	110
55	111	111	111	111
50	112	112	112	112
45	113	113	113	113
40 [1)]	115	115	115	115
35 [1)]	119	119	119	119
30 [1)]	125	125	125	125
25 [1)]	135	135	135	135
20 [1)]	150	150	150	150
15 [1)]	165	165	165	165
Application-restricted speed				
10 [1) 2)]	180	180	180	180
5 [1) 2)]	210	210	210	210
Stillstand [1) 2)]	250	250	250	250

1) Twin tyre load capacity = 2 x single tyre load capacity.
2) For these applications please contact tyre manufacturer.

fig. load-carrying ability at different max. speeds

Air in the MPT tire has the following **functions**:

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

An important feature of Continental MPT tires is the large air pressure range. They can be used from **6.5 bar** to **1.0 bar** at reduced load-carrying capacities and speeds.

The effect of various air pressures on traction and rolling resistance differs according to:

Road transport

A high air pressure which is adjusted to the vehicle's axle load and speed ensures **reduced rolling resistance** on secured roadways. This is illustrated in the following figure. The consequences are:

- **Lowered fuel consumption and thus higher cost-effectiveness**
- **Extended tire life**

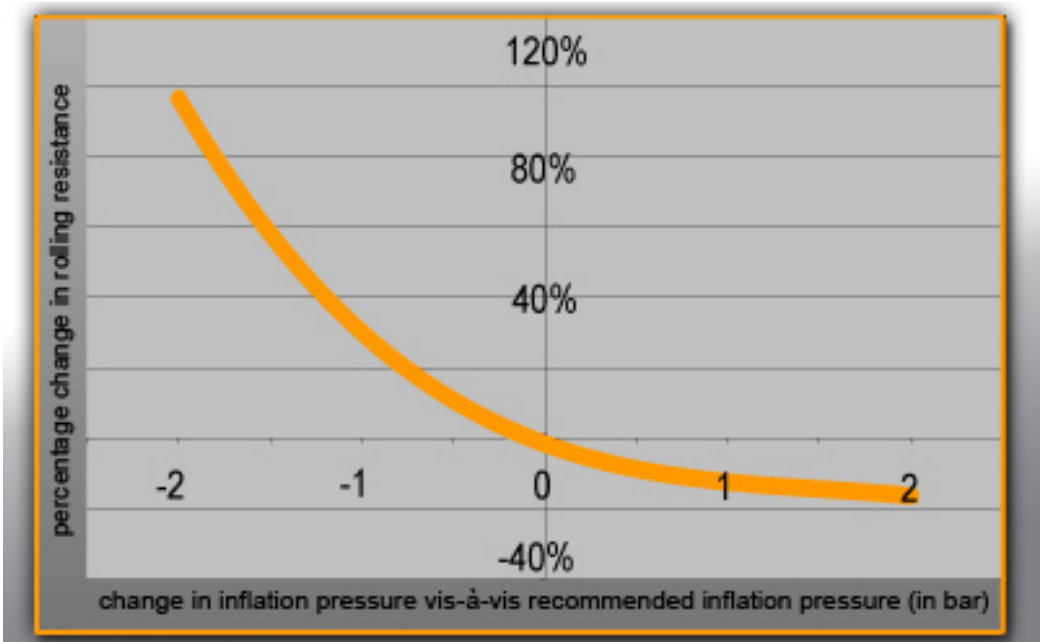

fig. diagram – rolling resistance vs. inflation pressure

Off-road transport

A lowered air pressure within the tire specifications increases the **support surface** and subsequently off-road **traction**. This is clearly shown in the figure.

n addition, **driving resistance** is reduced and the soft carcass aids **self-cleaning**.

The **recommended air pressures** for the off-road application of Continental MPT tires can be found in the technical manual.

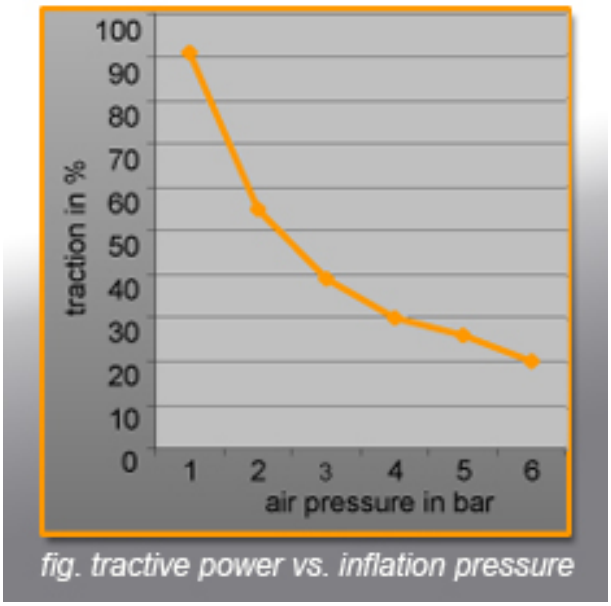

fig. tractive power vs. inflation pressure

Tire fillings

To increase traction and stability in special cases, the tires can be filled with **water and/or an anti-freeze solution**. In this case, the valve is replaced with a **combined filling and purging valve** on the valve stem. The fill level must **not exceed 75%** of the volume.

MPT tires comply with German **DIN** and international **ETRTO** and **ISO** standards which are interchangeable. There have been various types of identification for MPT tires in the course of their development. Even today, different types of identification are used alongside each other.

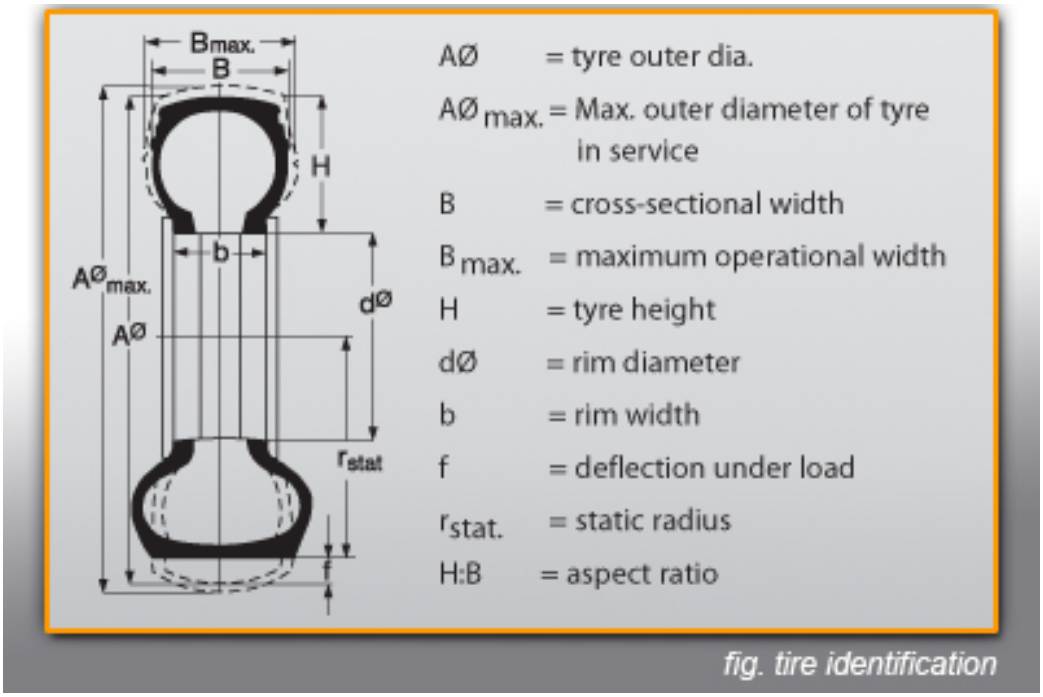

fig. tire identification

Important data included in the tire marking are:

- **Tire width (B)**
- **Rim diameter (d)**
- **Structure type (radial or cross-ply)**
- **Cross section ratio (H:B)**

This is supplemented by the carcass strength, which is indicated by the **PR number**. PR represents the **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)**.

Like tires, the rims also comply with German **DIN** and international **ETRTO and ISO** standards. In principle, MPT tires are **unsuitable** for truck wheel rims. Wheel rims feature the following markings as shown in the example:

Deep base rims are used for fitting on a **one-part rim**. Multipart rims are generally used for high axle loads **> 2,750 kg**.

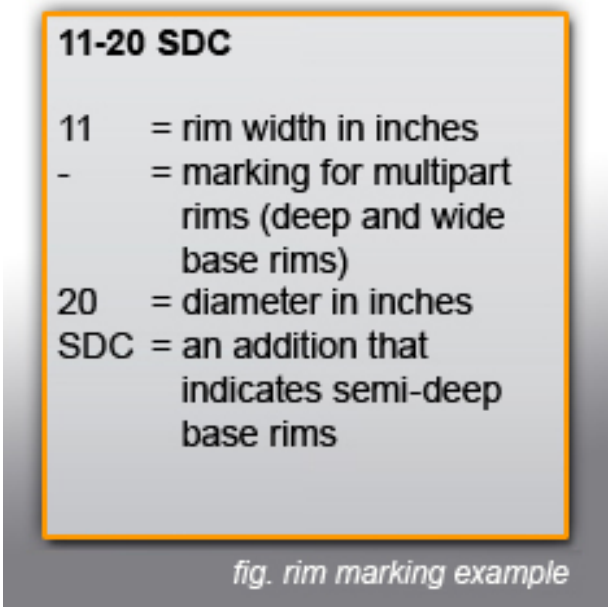

fig. rim marking example

Continental radial-ply tires have the following characteristics (compared to cross-ply tires):

Increased traction (20/25%)

The support surface on radial-ply tires is up to 35% greater, which increases the contact between the profile lugs and the ground and thus improves traction.

Increased mileage performance (20%) and reduced rolling resistance (15%) when travelling on roads

The belt layer on the tires reduces the movement of the profile lugs. This in turn reduces the rolling resistance and wear.

Reduced track depths

The increased support surface reduces ground pressure. On soft ground, this reduces the track depths as well as driving resistance.

Increased spee

The carcass structure provides a lower operating temperature and so increases the operating speed of Continental radial-ply tires.

Increased riding comfort

The radial-ply construction makes the side walls softer. This in turn improves riding comfort.

The construction of cross-ply MPT tires also offers several advantages:

- **a high level of resistance to side damage**
- **high lateral stability**
- **high damping capability**

On the carcass of cross-ply tires the cords are at an angle of about 40° to the running direction, crosswise from ply to ply. This results in a stronger side wall and thus the advantages mentioned above.

In the case of MPT tires, a distinction is made between the impact of different inflation pressures on traction and the impact on rolling resistance for which application?

- [ ] road servic
- [ ] construction sites
- [ ] off-road service
- [ ] multi-purpose applications

- **MPT tires are available in radial-ply and cross-ply design.**
- **The MPT tire consists of the carcass (radial or cross-ply) heel with core, running surface and side wall.**
- **The load-carrying capacity of a tire is determined by the air volume it contains.**
- **The air pressure has a significant effect on the tire’s properties**
- **When used on-road, the tire offers increased air pressure and reduced rolling resistance.**
- **When used off-road, the tire offers reduced air pressure, increased traction and reduced ground pressure.**
- **In principle, MPT tires are unsuitable for truck wheel rims.**