Tyres

The tyre is part of the tyre and wheel system and its job is to transmit the forces between the car and the road.

Function

The tyre is the only direct link between the car and the road. The tread contact area must support the weight of the car and must be able to transmit both longitudinal and lateral forces:

- Longitudinal forces in the direction of movement when accelerating or braking.
- Lateral forces transverse to the direction of travel that occur when cornering. These lateral forces are the forces that keep the car on the road on corners.

In addition, the tyres must also satisfy the following requirements:

- Precise transmission of steering forces
- Absorption and damping of bumps in the road
- Performance in both wet and dry conditions
- Low rolling resistance
- Low noise rotation
- Low vibration rotation
- Long service life

The tyres thus have a crucial influence on handling, safety and the comfort of a vehicle.

Tyre components

On average, a modern car tyre contains up to 25 components and 12 different rubber compounds. These include:

- Rubber (natural and synthetic rubber)
- Fillers (including carbon black, silica, carbon)
- Reinforcement (steel, polyester, rayon, nylon)
- Softeners (oils and resins)
- Vulcanisation chemicals (sulphur, zinc oxide, various other chemicals)
- Antioxidants and other chemicals

These components vary depending on the tyre size and type (for example summer tyres, winter tyres).

Tyres are manufactured using a complex production process, which ends with the process known as “vulcanisation”. This involves heating the green tyre under pressure at temperatures of up to 200°.

Construction

A tyre is not a homogeneous piece of rubber; it has a sophisticated construction.

1. Tread: For high mileage, good road holding and water displacement
2. Jointless bandages: Allow high speeds
3. Steel cord bracing ply: Optimises stability and rolling resistance
4. Textile cord ply: Constrains the internal pressure and keeps the tyre in shape
5. Inner liner: Makes the tyre airtight
6. Side wall: Protects against external damage
7. Bead reinforcement: Supports stability and precise steering behaviour
8. Core profile: Promotes stability, steering and comfort
9. Steel core: Ensures a secure fit on the rim

The tyre profile is hugely important. The tread profile of a tyre is its link to the road. The profile pattern has a critical impact on factors such as grip and vehicle handling.

Every tread profile is made up of four components:

- Ribs are tread blocks aligned with one another
- Grooves are the spaces between the bars - they have to be able to collect and quickly remove as much water as possible in wet conditions to prevent aquaplaning
- Tread blocks are the protruding rubber blocks in the tread, which are in contact with the road surfaces

- Sipes are fine slits in the tread blocks

The ribs, grooves, tread blocks and sipes can be arranged in particular patterns to optimise the performance of the tyre in terms of noise generation, handling, traction and wear. This enables tyre manufacturers to develop profile patterns tailored for specific driving requirements such as braking in the wet, handling on dry roads, resistance to aquaplaning and traction on ice and snow.

The tread and thus the profile is subject to natural wear. The tread depth reduces over the service life. A tyre is classed as worn and no longer roadworthy if it has less than the specified minimum tread depth of 1.6 mm.

Signs of wear - known as tread wear indicators (TWIs) - are wear indicators integrated into the tyres. They are uniformly distributed ridges in the longitudinal grooves all around the tyre. If they can be clearly identified and at the same height as the rest of the tread, the tyres need to be replaced.

Tyre types

A basic distinction is made between summer tyres, winter tyres and all-weather tyres:

- Summer tyres are made of a special rubber compound that provides excellent traction and handling characteristics on dry and wet roads in warmer weather.
- Winter tyres provide excellent grip on snow and ice covered roads, as well as on wet roads and in cold weather. Winter tyres are marked with a snowflake symbol.
- All season tyres are a compromise solution combining features of both summer and winter tyres. However, all season tyres do not offer the same advantages as a summer tyre in summer or a winter tyre in winter. All season tyres should be viewed as a solid mixture of summer and winter tyres, but because of their versatile properties they are not suitable for extreme weather conditions.

Tyres are also differentiated according to the position of the cord plies: On radial tyres, the cord plies in the carcass are at a 90 degree angle to the direction of movement. For cars, radial tyres - also known as belt tyres - have completely superseded cross-ply tyres.

EU label

All tyres sold in the European Union must have a prescribed tyre marking. The EU tyre label provides specific information about a tyre’s environmental and safety properties taking into account the three following criteria: Fuel efficiency, wet braking properties and noise level.

Fuel efficiency

The fuel efficiency of a tyre depends on its rolling resistance. It is rated using the classes A (highest fuel efficiency) to G (lowest fuel efficiency). From one class to the next, the fuel consumption increases by around 0.1 litres per 100 kilometres.

Wet braking properties

A tyre’s wet braking properties are crucial for safe driving on a wet road. Wet grip describes a tyre’s performance in the wet and is also split into classes A to G. In general, the EU label is based on a speed of 80 kilometres per hour. If a vehicle brakes at this speed in wet conditions, a class A tyre comes to a standstill after 28 metres. By contrast, a class F tyre comes to a standstill after 46.5 metres. As a result, there are more than 18 metres between these two classes

Noise level

The noise level relates to the tyre’s external rolling noise. It is measured in decibels. The lowest sound level is between 67 and 71 dB. The highest level is between 72 and 76 dB.

Safety

The tyre is an extremely safety critical component. As a result, tyres should be checked and maintained regularly to guarantee continuing safety on the road.

Value retention

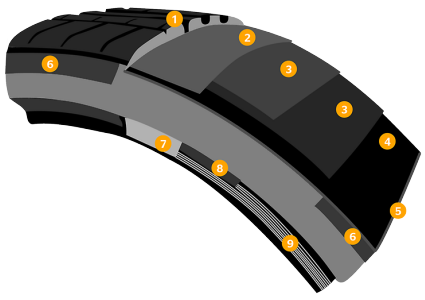
Careful handling and regular checking and maintenance contribute to value retention. Drivers should regularly check the air pressure, avoid bumping into kerbs and always have new tyres balanced by a specialist dealer.

Protection of the environment

The well-known manufacturers place considerable value on protecting the environment. They go to considerable lengths to make their tyres more energy efficient and environmentally friendly.

Disposal of used tyres in landfill is illegal in the European Union and other countries. Many tyre dealers offer disposal of used tyres for their customers when they buy new tyres.

Bilder



[Translate to English:] Bild: Continental

Hersteller

Quelle:
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