



Tyre Pressure Monitoring Systems

Tyre Pressure Monitoring Systems (TPMS) are a way of warning a driver that a tyre is incorrectly inflated, which will decrease the safety and performance of the vehicle, and increase the risk of an accident.

Tyre Pressure Monitoring Systems in the USA

There has been research conducted in the USA about the benefits that could be gained by implementing TPMS on all vehicles, resulting in a safety standard requiring TPMS to be fitted to all vehicles by November 2006

The National Highway Traffic Safety Administration undertook surveys in February of 2001 in order to quantify the number of vehicles on the road with tyres that were only inflated to $\frac{3}{4}$ of the recommended level. The results revealed that just under 56% of passenger cars had at least one tyre which was under inflated and this highlighted a need for more frequent tyre checks to be carried out by drivers.

Tyre pressure and safety

It is difficult to spot an under inflated tyre visually, especially without a fully inflated tyre as comparison. Due to the rigidity of current tyre walls, a drop in pressure will only lead to slight increased flexing of the wall when the tyre is viewed at rest. This is why TPMS can be advantageous, it can warn drivers that their vehicle has an under inflated tyre despite the tyre looking normal.

There are many dangers to having under inflated tyres, because they are designed for use at their recommended pressure. Under inflation can lead to increased deformation in the tyre wall as it concentrates the load upon the tread shoulders, this reduces the amount of surface contact the tyre has with the road. This can have many consequences.

- Increased wear of the tyres treads which will lead to a higher chance of aquaplaning in the wet.
- Reduced handling characteristics and a reduced control of the vehicle.
- Longer stopping distances.
- Higher chance of the tyre delaminating, which could lead to a sudden tyre failure.



Road Safety..... Information

How they work

There are three types of Tyre Pressure Monitoring Systems.

Direct Tyre Pressure Monitoring Systems

The most accurate and reliable form of TPMS is the direct system; this uses sensors to monitor the tyres' pressure and has the advantage that it can take into account factors, such as the tyres temperature, when calculating the pressure. These systems provide the most accurate feedback to drivers on their tyre's pressure.

Indirect Tyre Pressure Monitoring Systems

Indirect TPMS is an addition to the wheel speed sensors used as a component of the Antilock Brake System (ABS). A decrease in tyre pressure will lead to a decrease in the wheel's radius; this means it will rotate faster compared to the other tyres and the speed sensors detect this change.

This system has the major advantage that it is much cheaper to implement and quicker to introduce onto new vehicles, but has major disadvantages due to the fact that it cannot detect a slow and equal decrease in pressure on every tyre. The system also needs to be calibrated more frequently, which could be a difficulty for users.

Hybrid Tyre Pressure Monitoring Systems

The concept of a Hybrid TPMS is to combine the advantages of both systems – the accuracy of the direct system and some of the cost savings of the indirect system. The pressure sensors are on two of the vehicles wheels instead of four, and the wheel speed sensors compare the differences in speed to these wheels to detect a dip in pressure.

Tyre Pressure Monitoring Systems and your vehicle

When driving a car with TPMS, make sure that you know how it will communicate a drop in tyre pressures to you. There may be several different ways, such as a light on the dashboard, an audio signal or a diagram of the car with the tyre suffering the decreased pressure highlighted. If it is by a light on the dashboard then make sure you understand what it looks like as there have been several ways developed to communicate a decrease in tyre pressure.

Find out if the TPMS in your car is direct or indirect, as this will give you some idea of its accuracy and in what situations it will alert you to under inflated tyres.

Although TPMS is a very useful tool in reminding drivers that tyres of a vehicle need frequent checks, it should not be seen as a replacement. A driver should still perform regular tyre checks of his vehicle, which involve testing the pressure with an accurate gauge, checking the tyre wall for damage, and making sure that the tread is not worn. A tread depth of 1.6mm is the legal minimum although 3mm and above provides significantly greater safety benefits.