

What you need to know about:

TRUCK TYRE TECHNOLOGY



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INTRODUCTION

Tyre costs can often seem small by comparison with other vehicle running costs, such as fuel, repairs and maintenance. But it is a big mistake to simply regard tyre costs in isolation.

Whether tyres are included as part of a contract hire package or you are responsible for them yourself, the knock-on effects of ill-considered specification or a lack of focus with ongoing tyre husbandry can be substantial.

Consider the fuel economy for a fleet of 50 high-mileage trucks, for example. One estimate of the annual fuel bill savings possible for such a fleet as a direct result of fitting tyres with an A-grade rating for fuel efficiency (low rolling resistance tyres) instead of D-grade tyres from the same manufacturer is no less than £200,000. Even when allowance is made for the higher initial purchase price of the most fuel-efficient tyres, this scale of potential cost-saving is considerable.

Fleet managers don't need to spend hours studying the finer points of tyre manufacturing to take full advantage of the latest tyre technology. The aim of this guide is to highlight what you really do need to know and where more information can be found easily.

Of course, if you contract hire your fleet or have tyres included under a fleet management contract, it's worth checking your supplier is managing them efficiently and in your best interests.

For example, when specifying a new vehicle, there is a huge choice of tyre brands, tread patterns and sizes available – and the best firms will use this as an opportunity to ensure your new assets are delivered on the optimum rubber for the job. Getting tyre specification right at the outset – and ensuring it is matched throughout the life of the vehicle – means you'll benefit from maximum fuel efficiency, performance, uptime and safety from the first mile.

Should you wish to discuss any of these issues in more detail, please don't hesitate to contact your Fraikin Account Manager, or call 0800 052 4455.

TYRE SAFETY AND THE LAW

Though UK law on the dividing lines between legal and illegal tyres is clear, it is nevertheless misunderstood surprisingly often. On minimum tread depth there is a difference, as with many other regulations, between vehicles above and below the 3,500kg gross vehicle weight (gvw) threshold.

For passenger vehicles constructed or adapted to carry no more than eight passengers including the driver, and goods vehicles or trailers with a maximum gross weight not exceeding 3,500kg (i.e. cars and light vans) the minimum legal tread depth is 1.6mm over the central three-quarters of tread width and around the tyre's entire outer circumference.

For vehicles above 3,500kg (including trucks, buses and coaches) the minimum tread depth limit is 1mm.

This 1mm tread depth limit also applies to regrooved tyres, and it is worth emphasising that the regrooved tread pattern must follow the original one or the tyre becomes illegal. Tyre manufacturers generally recommend that tyres be regrooved when the original tread depth is worn no lower than 4mm – the tyre must state 'regroovable' on the sidewall and all regrooving must be carried out by a professional.

A tyre is in an unlawful state, when it:

- is not suitably inflated for the vehicle or trailer's current use
- has a cut more than 25mm or 10 per cent of the tyre's section width, whichever is greater, deep enough to reach the ply or cord

- if any cut in the tyre, no matter how small, exposes the cords
- has a lump, bulge or tear caused by separation or partial fracture of its structure
- is unsuitable for the vehicle's use or to the type of tyres fitted to the vehicle's other wheels (temporary-use spare wheels and tyres are exempt)
- has any portion of ply or cord exposed

The penalties for drivers of vehicles with unlawful tyres are steep: a maximum fine of £2,500 and three driving licence penalty points per illegal tyre.



Age concern



There is no maximum legal age limit for any tyres at present in the UK, but calls for the introduction of a ban on tyres more than 10 years old, at least on buses and coaches, have been growing since a serious coach crash in 2012 which saw the vehicle swerve suddenly off the road and hit a tree. An inquest found that the cause was catastrophic failure of the tyre fitted to the nearside front of the vehicle's steer axle.

The tyre was 19.5 years old, 2.5 years older than the coach itself. Its tread was only half-worn and the tyre had been neither regrooved nor retreaded. No evidence of impact damage, puncture repair or any manufacturing defect was found – and the only possible cause of the tyre's failure was age-related deterioration. The government has since commissioned Berkshire-based TRL (formerly the Transport Research Laboratory) to carry out a £250,000, 12-month research project designed to "provide a fuller picture of the safety of tyres as they get older."

The age of any tyre is revealed by a sidewall code. Since 2000, a simple four-digit code has been used, with the first two digits denoting the week of manufacture and the last two the year. Thus "1915" on a sidewall means it was manufactured in week 19 of the year 2015.

ROLLING RESISTANCE AND TYRE LABELLING

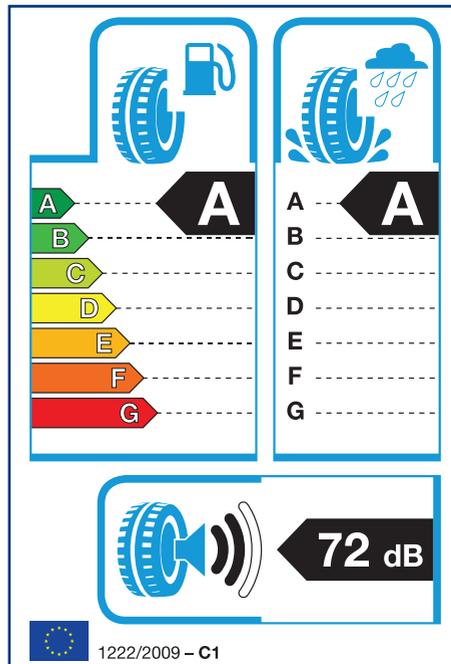
Nobody would expect any free-standing tyre given a shove on a perfectly flat surface to carry on rolling indefinitely. What causes it to slow down and stop is rolling resistance, often regarded as a single entity but made up of several elements, the three main component parts of which are:

- internal friction of the tyre material (85-92%)
- friction between the tyre and road (7-10%)
- tyre aerodynamic drag (1-5%)

Lowering the rolling resistance of truck tyres can undoubtedly have a big beneficial effect on fuel economy. Now, as a result of European Union (EU) tyre labelling regulations, it is easier than it once was to make meaningful comparisons between tyres, taking rolling resistance into account. Under these EU regulations, the rolling resistance, wet grip and noise levels of tyres must be specified (though not actually with labels for commercial vehicle tyres).

Tyres are ranked and colour-coded from A to G depending on the bands into which their rolling resistance and wet-grip coefficients fall.

Wet grip is measured according to an ISO (International Standards Organisation) procedure involving the vehicle being braked from 80km/h (50mph) on a wet surface. Tyres with the best wet-grip rating typically have a 30% shorter stopping distance than those with the worst rating.



But it is worth underlining that good performance in this wet-grip braking test does not necessarily translate into other tests such as aquaplaning and directional control.

The noise emitted by a tyre, measured in decibels (dB), is shown in the EU rating system as one, two or three sound-wave icons. A one-wave tyre is half as noisy as one with two waves, and a tyre rated at three waves is twice as noisy as one with two. Noise is measured at the side of a test track as a vehicle with its engine switched off coasts past at 80km/h.

TYRE PRESSURE MONITORING SYSTEMS

Tyre pressure monitoring systems (TPMS) became a legal requirement on all new cars in the European Union from 1 November 2014. And since 1 January 2015 a faulty or missing TPMS means MOT test failure for a car in the UK. But there is no EU or UK legislation requiring such systems on trucks and buses at present. It is on the way, however, applying to new type approvals from September 2020 and to all new vehicles from one year later.

The explanation for a recent surge in truck operator interest in TPMS lies far more in the equipment's ability to lower operating costs than in any legislative move, however.

Truck tyre prices have been rising sharply in the UK as a result mainly of two factors: global raw material cost increases for tyre manufacturers (including steel and natural rubber), and the devaluation of sterling following the Brexit referendum. The list prices of most new truck tyres went up at well above inflation in the second half of 2017.

The range of tyre pressure monitoring equipment available is now greater than it has ever been and a growing number of operators are turning to this equipment to keep costs under tight control.

The experience of one Cumbria-based operator provides a good illustration of this trend. It has a fleet of about 20 multi-axle rigid trucks, fitted mostly with skip-handling equipment. In 2017 the company's transport manager tried a tyre pressure monitoring system (ContiPressureCheck from Continental) on one truck for the first time. He

reckons the system paid for itself easily within one month simply by providing early warnings of gradual pressure loss in several tyres.

This gradual pressure loss probably would have gone unnoticed without the TPMS and the upshot could have been blow-outs and complete loss of tyres. "Blow-outs can cost more than simply replacing the tyres," argues the transport manager. "Body and light damage is always a possibility, and far, far worse, injuries or even fatalities among drivers and other road-users."

All trucks in this fleet are now fitted with tyre pressure monitoring systems.



WINTER PERFORMANCE

For several years truck and bus tyre manufacturers have offered tyres with Three Peak Mountain Snowflake (3PMSF) certification – identified by a small triangular ‘Three Peaks’ icon on the sidewall. Tyres can only carry this symbol if they pass stringent tests in defined winter conditions, which demonstrate better handling on snow-covered roads than tyres which are simply labelled M+S (Mud and Snow).

3PMSF-rated tyres are considered the optimum fitment for trucks in the UK, where a dedicated winter tyre cannot be justified given the number of days we face snow on our roads (versus other parts of Europe).

But in May 2018 Michelin introduced new tyre technology for light commercial vehicles (LCVs) from 3.5 tonnes upwards, which it claims will be a game-changer in the UK market. The new Agilis CrossClimate is a summer tyre with a full winter capability, which Michelin says boasts safety in all weathers, high mileage, robustness, damage

resistance and long-lasting performance, equating to low total cost of ownership (TCO).

LCVs are among the fastest growing sectors in new vehicle sales, thanks to the boom in online shopping, home deliveries and heavy vehicle restrictions in cities – and there’s a growing expectation from customers for them to be operational all-year-round, regardless of the weather.

Jonathan Layton, Michelin’s Head of Fleet, says: “The Agilis CrossClimate solves the problem of wintry conditions bringing a van fleet to its knees in the UK. It also eradicates the expense of buying different sets of winter and summer tyres – which, given the relatively mild climate across great swathes of the country in winter, can be an unwanted outlay.”

It’s a tyre inspired by the Michelin CrossClimate+ car tyre range, already specified by Fraikin on all rapid response cars used by NHS Blood & Transplant (a long-standing Fraikin fleet management customer).



Sizing up innovations

The principle of putting true value before initial cost is one reason for a big recent change in tyre sizes favoured by truck operators and manufacturers in the UK. Another factor behind this trend is the introduction of Euro 6 exhaust after-treatment for diesel engines, and growing interest in alternatives to diesel, such as liquefied natural gas (LNG).

This is having an effect on axle loadings which in turn influences tyre size choice. Previously, the top-selling truck tyre size here has been the 295/80 R 22.5. But lately there has been a strong move to 315/70 R22.5 in the UK, even though the wider tyre is always going to have a higher initial price tag.

DAF Trucks switched from 295/80 to 315/70 as its standard tyre size at the same time as introducing its Euro 6 range. The main reason was the extra front axle loading added by the Euro 6 exhaust after-treatment kit. A steer axle shod with 295/80s is limited to a 7,100kg plate in the UK whereas the same axle on 315/70s can go to 7,500kg.



PROTECTING AGAINST WHEEL LOSS

Wheel detachment continues to be a major cause of concern for operators and is widely recognised as a global issue. When a wheel becomes detached from a truck, it has the potential to accelerate to speeds of up to 150 km/h – before potentially colliding with other vehicles or road users at an equivalent force of around 10 tonnes.

But how often do such incidents occur? In 2006 a TRL report into wheel loss on commercial vehicles, published for DfT, estimated that the typical annual frequency of wheel fixing problems in the UK alone stands at between:

- 7,500 and 11,000 wheel fixing defects
- 150 and 400 wheel detachments

- Between 50 and 134 resulting in damage only accidents
- 10 and 27 resulting in injury accidents
- 3 and 7 fatal accidents

There has been considerable research and investigative work on this subject over many years, and despite efforts to raise awareness of this issue wheel detachment has remained a problem.

In response to this, a technology company called Wheely-Safe has launched a new solution. Working in conjunction with Michelin, it is billed to be the most effective wheel loss, brake and hub overheat early-warning system on the market.

Previously wheel loss has been tackled by wholly mechanical methods, such as indicator tags, wheel nut restraining systems, or dual lock nuts. All have shown varying levels of success, but none have been able to warn the driver of imminent wheel loss on the road.

Wheely-Safe's technology is miniature and robust, providing an in-motion alert to the driver after approximately one turn of adjacent wheel nuts (1mm of movement). It straddles two wheel nuts and is held in place with a bracket. When the wheel nuts start to work loose, the switch opens, and a radio frequency alert is immediately sent to a display unit in the cab, warning the driver of imminent danger. It can also be linked with telematics systems to provide alerts to the transport office or workshop team as soon as a loosening wheel is detected.

It will also communicate with a receiver in the cab in the same way that traditional Tyre Pressure Management Systems connect, combining these functions to deliver a fully integrated in-motion driver alert package consisting of a TPMS, patented wheel loss system and brake/hub temperature alert system.



AN ALTERNATIVE TO NATURAL RUBBER?

Between about 10 and 30% of the rubber content in commercial vehicle tyres today is natural rubber, sourced from plants grown mainly in south-east Asia. In truck tyres the natural rubber content can be even higher.

Market demand is outpacing production capacity as newly planted rubber trees cannot be tapped for several years. What's more, a huge carbon footprint comes from transporting unrefined rubber for processing and manufacturing and tyre

makers are understandably keen to find an innovative, more environmentally-friendly alternative to natural rubber.

Continental claims to have done so in the improbable form of dandelions. The roots of one particular type of dandelion are said to contain the same natural latex as rubber plants, and this dandelion can be grown in Europe, close to manufacturing plants, and can be harvested within one year of planting. Continental calls the resulting

rubber Taraxagum. Truck tyres made from this are expected to be in production within about five years – so watch this space!

Bridgestone has also developed a new polymer – the world's first to bond synthetic rubber and resins at a molecular level. Called High Strength Rubber (HSR), it is a hybrid material that boasts levels of durability and abrasion resistance that eclipse those of natural rubber. For this reason, Bridgestone believes it to be a promising next-generation tyre material capable of achieving the required levels of performance while using less materials.



Where can I find more information?

British Tyre Manufacturers Association
www.btmauk.com

Bridgestone
www.bridgestone.co.uk/truck-and-bus

Continental
www.continental-tyres.co.uk/truck

Goodyear
www.goodyear.eu/uk_en/truck/

European Tyre and Rubber Manufacturers Association
www.etrma.org

Lasalign
www.lasalign.com

Michelin
www.trucks.michelin.co.uk

National Tyre Distributors Association
www.ntda.co.uk

Retread Manufacturers Association
www.retreaders.org.uk

Tyre Recovery Association
www.tyrecovery.org.uk

TyreSafe
www.tyresafe.org

Wheely Safe
www.wheely-safe.com

Disclaimer: Produced in September 2018, this guide aims to highlight some key trends and technologies concerning truck tyre technology. However, it is intended for information purposes only and we do not make any warranty or representation on the completeness, correctness, accurateness, adequacy, usefulness or reliability of such information. Fraikin will not accept any liability based on any information provided in this document.



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