

Rubber or Composite Runflats for Military and Off Road Vehicles

Tyron, the originators of the well filler band, have designed and developed a unique rubber runflat system for military and off road vehicles. This patented system is a modular design and does not require a hydraulic press to squeeze the runflat into the tyre, making this the only field mountable and demountable rubber runflat system in the World and solves the logistical problems of current systems when changing tyres.

Why rubber for Military and 4x4?

There are a couple of obvious reasons for using rubber rather than composite/plastic when designing runflat systems for off road 4x4 and military vehicles.

Firstly, that rubber will absorb shock from impingement caused by curb strikes, pot holes and operating in a general hostile environment. Rubber drastically reduces the vibration and stresses that are transmitted through the runflat to the wheels, axles and drive shafts allowing you to continue with little change to the handling of the vehicle whilst retaining a degree of comfort for the driver and passengers.



Secondly, rubber is a compliant material and prevents the damage caused to the tyre from impingement between the runflat and the inside of the tyre. The tyre manufacturers have sent out circulars with regards to these problems.

Michelin statement:

“Metal, hard plastic or other non-compliant materials will create damage to the interior surfaces of the tires when used in off road and/or reduced inflation pressure”.

Bridgestone statement:

“Devices made of hard or rigid materials such as metals, plastics or composites, may cut, tear, scrape or abrade the innerliner, bodyplies and/or bead areas of the tyre. Such damage may occur intermittently depending on the operating conditions and may not be immediately apparent from a visual inspection of the tyre exterior. However, the damage may progress to splitting, blistering, bulging and/or separation of tyre structural plies and cause pressure inflation loss or tyre failure. Only install runflats/beadlocks devices made from flexible material.”

Advantages of Beadlock

The less obvious reason for using rubber rather than composite and probably the most important is the need for 'Beadlock'.

Without adequate compression of the tyre beads against the flanges of the wheels (Beadlock) the vehicles are going nowhere, with only the 'drag' from the deflated tyres, the wheels will slip inside the tyres and that is on level ground, let alone trying to negotiate any obstacles or hills.

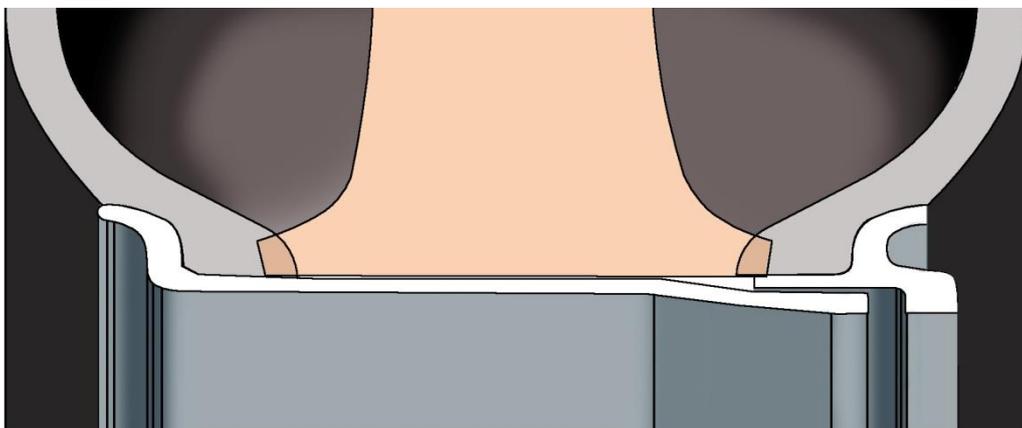
Military vehicles are required to continue their mission and/or return to base with one or all of their tyres deflated. Defence forces demand a **guaranteed minimum** runflat distance performance of 50km, preferably 75km, with 2 or more tyres deflated and a minimum of 2 hours off road negotiating hills and obstacles like curb strikes.

So why not composite or hard material?

The answer is in the manufacturing tolerances of the wheels and tyres. Michelin informs us that there is a bead tolerance of +/-3mm on all their 20" military tyres, therefore we have a total bead variance of 12mm, add to this the wheel tolerances and we have up to 20mm.

With Composite runflats we have to under manufacture the width, otherwise the runflat will either break during installation or the wheel will not seal properly, in any event, it is not technically possible to guarantee adequate compression to prevent the tyres from slipping or spinning on the wheels.

With rubber we over manufacture the width of the runflat to allow for these tolerances and during the installation, the rubber will compress the tyre beads against the flanges of the wheels guaranteeing the beadlock, as you can see in the illustration below.



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Flat Tyre Protection

An additional necessity for beadlock is to prevent foreign objects like sand, stones and dirt getting inside the tyres. When the runflats are installed a high temperature synthetic lubricant is inserted into the tyres to reduce friction, any sand and dirt will mix with the lubricant and reduce the distance you can travel.

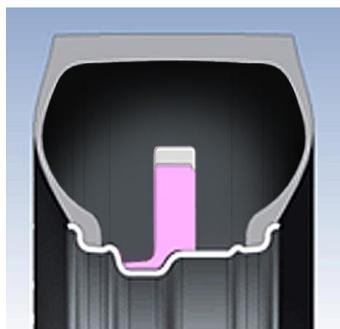
Foreign objects in the tyre can also affect the CTI (Central Tyre Inflation).

When to use composite

Composite runflats do have a role to play in protecting vehicles. They are lighter and less expensive to manufacture and are designed to fit the existing single piece wheel. They work very well on vehicles using the public highways like armoured limousines and heavy vehicles like water cannons operating in riot situations. It must be stressed, that all manufacturers of composite runflats have a performance disclaimer and that is why they say 'up to'!

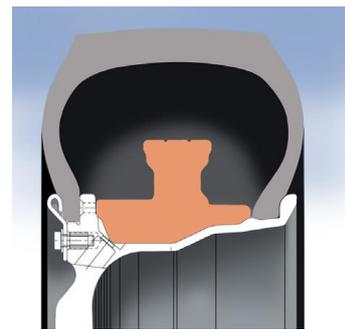
R4 for 4x4 SUV vehicles.

The armouring of an SUV puts additional stresses on the wheels, tyres and, when deflated, the runflats. The additional weight takes the tyres to their load limitations, raises the vehicle centre of gravity, and with aggressive driving under ballistic attack or just getting away from a dangerous situation, can make the experience for a passenger very exciting



Standard wheel and runflat

For these reasons, Tyron developed the R4 heavy duty alloy wheel with its rather simple but ingenious beadlock. When using standard wheels on a SUV, it is not possible to lock the tyre beads to the rims and when the tyres are deflated the beads are free to move inwards causing



R4 Alloy Wheel with Beadlock

reduced control of the vehicle, affecting steering, braking and acceleration and at the same time, sand, dirt and stones can get inside the tyre, reducing the distance you can travel.

The R4 is manufactured to ETRTO (The European Tyre and Rim Technical Organisation) standards and approved to carry 1,650kg, more importantly; the strength of the wheel has also been increased where the runflat sits and by installing our rubber runflat you eliminate the wheel damage caused by composite even when running flat.

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Flat Tyre Protection

The picture shows what impingement damage can be done to a wheel and composite runflat under normal driving conditions with the tyre properly inflated. The vehicle has driven over rough ground and the inside of the tyre has hit the runflat and the shock has broken the runflat and the Aluminium wheels. You could reduce the height of the runflat which would reduce the possibility of impingement; however, if the vehicle did have a blow out, or was attacked then this would affect the control and reduce the distance you can travel, also, you are still going to get the damage when the tyres are deflated and running flat!



The solutions for all these problems is to use rubber!

About Tyron

Since 1977 Tyron has been developing a range of tyre safety features which are designed to keep vehicles moving safely at speed and for distances well in excess of standard requirements.

In the early 80's Tyron was contacted by the UK MoD to develop a range of steel bands for the Land Rover steel wheels. These were not only far stronger than the aluminium bands but also solved the problem of 'catalytic' reaction between the two different metals where the aluminium bands were prone to welding onto the steel wheels preventing removal of tyres when they needed to be changed.

In 2008 Tyron invented the world's first ever multi piece rubber run flat All Terrain Runflat (ATR) insert which can be fitted in the field to both military split rims and ordinary tubeless wheels, giving excellent off road capabilities with run flat capability of up to 100 km which far exceeds the Finabel standard.



In 2009 Tyron developed the unique R series wheel for armoured 4x4, 6x6 and cash carrying vehicles. This super strong alloy wheel, with a load rating of 1650kg, incorporates an ingenious beadlock design. When fitted with the ATR they allow travel on or off road for over 50km with all tyres deflated.

In 2013 Tyron partnered with Global Wheels in South Africa to produce a range of military two piece bolt together rims made of either steel or alloy adding to their existing range of less expensive 3 piece wheels. This allows Tyron to offer complete assemblies of wheel, Michelin tyres and run flats fully assembled.

In 2015 the company developed the Friction Shield lubrication system. This provides the right amount of lubricant to ensure that the tyre is not damaged further by reducing the heat generated by friction between the insert and the inside of the tyre itself, this enables the vehicle to keep functioning effectively over longer distances and at higher speeds.

Friction Shield's lubrication system is in sealed sachets to stop it drying out, or becoming contaminated and is permanently attached to the run flat itself making it impossible to forget when changing tyres.

Further information is available at www.tyron.com