

TTIPS VOL. 34/22 – TECHNIQUES - TIRE (TYRE) PRESSURE -



Introduction

Fellow riders.....you may have noticed that KABC is sponsoring a series of Tire Clinics during the months of September and October. You might ask, is that much attention to bike tires really warranted? Or, is correct tire pressure really that important for the performance of your bike? Keep reading.

Well, you may remember (okay, maybe not) that in Volume 1/22 I remarked that your glutes are the unsung heroes of your bicycling anatomy. Well, in a similar vein, your tires are the unsung heroes of your bike.

Most of us don't think even a moment about our wheels/tire/tube setup. Well, Speedy, please think again. Good tires at the correct pressure can make all the difference in your ride satisfaction and, if you are competitively minded, the speed of your bike.

There is a considerable amount of science, research and development dedicated to tire design and tire materials focused on the reduction of rolling resistance. For my part, I have studied the subject of "rolling resistance" in bike tires for the past few years. Ask me sometime when you have time to spare, are patient, and are well-rested....it's not what you think it is. To make it more interesting (for me at least), there is an ongoing revolution in the design and pairing of

wheels and tires that promises to help competitive cyclists ride even faster and handle their bikes better. I guess that's a subject for another time, perhaps at the next KABC Happy Hour.

For now, let's just focus on tire pressure. Here we go.....

Road Bike Tyre Pressure Explained | Everything You Need To Know

Finding the right tyre pressure for your road bike tyres can increase your speed, comfort, grip, and puncture resistance

By Simon von Bromley / Cycling.com
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Gone are the days of simply pumping up your road bike tyres to the maximum pressure permitted and hoping for the best. Not only are excessively high pressures uncomfortable, they've also been proven to slow you down.

Optimising the tyre pressure on your road bike is, therefore, one of the simplest – and cheapest – ways to improve the performance and comfort of your bike. Equally, for beginner cyclists, it's not always clear what pressure you should pump your tyres up to. While most tyres have a recommended pressure range printed on the sidewall, there's rarely any more guidance than that. Ultimately, the pressure you need to run will vary depending on the rider, bike and road conditions, but it's fairly easy to get into the right ballpark. Whether you're just starting out or you're an experienced rider looking to optimise performance, we're here to help. So, how can you find the right tyre pressure for your bike? In essence, it's all about finding a balance.

You need your tyre pressure high enough to minimise energy losses from the deformation of the tyre and to offer predictable handling through corners. But you also need it low enough to absorb, rather than bounce over, imperfections in the road.

In this article, we'll run through why tyre pressure is so important, what factors influence finding your optimum pressure, and how you can find a pressure that works best for you.

If you're just starting out, we've also got an explainer on how to pump up a bike tyre, as well as a guide to inner tubes, with everything you need to know about tube sizes, valve types, materials and so on.

We've also got a guide to tubeless setup, if you're considering making the switch, and buyer's guides to the best road tyres and best tubless tyres if you're looking for new rubber.

Key points to consider

Before we get stuck into the details, here are four key things to consider when it comes to road bike tyre pressure.

Why bother?

On a basic level, getting your tyre pressure right will make your rides easier, more comfortable and lower your chances of punctures.

From a performance standpoint, optimising tyre pressure is critical to reducing rolling resistance and improving comfort. Rolling resistance is the force resisting the motion of your tyres rolling on the ground.

If your tyre pressure is too low, more energy will be lost in the deformation of the tyre casing and friction between the tyre and the road. It also increases the chance of pinch flat punctures. If your tyre pressure is too high, the tyre will be so stiff your bike will begin to vibrate over imperfections in the road surface, negatively affecting comfort and wasting energy.

What *feels* fast, might not be fast

Very high tyre pressures might feel fast, but they're not.

Once you go past a certain point, adding more air to your tyres actually decreases grip, increases high-frequency vibrations and causes extra muscular fatigue. All of these things slow you down.

Getting your tyre pressure right is both faster and more comfortable.

Tools for the job

In order to set the right tyre pressure on your road bike, you'll ideally have access to a track or floor pump with an in-built pressure gauge. You don't need to spend loads, but given how much you'll use it in the long term, getting something high-quality makes sense.

If you really want to fine-tune your tyre pressures, one of the best tyre pressure gauges is a worthwhile investment, too.

Proceed with caution

When it comes to road bike tyre pressure, err on the side of 'too low' rather than 'too high'.

According to testing by Silca, performance decreases rapidly once you go past the optimum pressure for a given setup. Being a little too low only brings a relatively small speed penalty, but should be noticeably more comfortable on rough roads.

Recommended tyre pressures

Helpfully, some tyre manufacturers offer pressure recommendations or pressure calculators for their range of road bike tyres, and we can take these as general starting points for dry days on smooth tarmac.

As we'll come on to, you should pay close attention to the actual size of your tyres when inflated because this can change optimum pressure for any given rim and tyre combination.

If the actual inflated tyre width is larger than the labelled width, the tyre will need slightly less pressure than recommended by these tables and vice versa.

Likewise, the optimum tyre pressure will be higher for heavier riders, or for riders carrying loads on their bikes, and lower for lighter riders.

As a final caveat, it's important to adhere to the pressure limitations set by the manufacturers of both your rims and tyres, particularly with regards to the upper limits. These are typically printed on the tyre or rim sidewalls.

If you have a set of wheels with hookles rims, the maximum permitted tyre pressure may also be much lower than with hooked rims.

Tyre pressure for 23mm and 25mm tyres

700x23c tyre on a 17mm rim		700x25c tyre on a 19mm rim	
Rider weight	Recommended pressure	Rider weight	Recommended pressure
≤ 50kg / ≤ 110lb	84psi / 5.8bar	≤ 50kg / ≤ 110lb	73psi / 5bar
51-57kg / 112-126lb	90psi / 6.2bar	51-57kg / 112-126lb	78psi / 5.4bar
58-65kg / 128-143lb	96psi / 6.6bar	58-65kg / 128-143lb	83psi / 5.7bar

700x23c tyre on a 17mm rim		700x25c tyre on a 19mm rim	
66-73kg / 145-161lb	102psi / 7bar	66-73kg / 145-161lb	88psi / 6.1bar
74-81kg / 163-179lb	106psi / 7.3bar	74-81kg / 163-179lb	93psi / 6.4bar
82-88kg / 181-194lb	110psi / 7.6bar	82-88kg / 181-194lb	98psi / 6.8bar
≥ 89kg / ≤ 196lb	115psi / 7.9bar	≥ 89kg / ≤ 196lb	103psi / 7.1bar
≥ 96kg / ≤ 212lb	Use 700x25c tyre	≥ 96kg / ≤ 212lb	108psi / 7.4bar
On a 19mm rim: lower pressure by 0.4bar / 6psi		On a 21mm rim: lower pressure by 0.3bar / 5psi	

The following recommendations are from Pirelli for its TLR tubeless road tyres, but are good starting points regardless of the brand of tyres you're using, providing you take the various factors we'll run through later into account when going on to fine-tune tyre pressure.

Tyre pressure for 28mm and 30mm tyres

700x28c tyre on a 19mm rim		700x30c tyre on a 19mm rim	
Rider weight	Recommended Pressure	Rider weight	Recommended Pressure
≤ 50kg / ≤ 110lb	65 psi / 4.5bar	≤ 50kg / ≤ 110lb	58psi / 4bar

700x28c tyre on a 19mm rim		700x30c tyre on a 19mm rim	
51-57kg / 112-126lb	70psi / 4.8bar	51-57kg / 112- 126lb	61psi / 4.2bar
58-65kg / 128-143lb	75psi / 5.2bar	58-65kg / 128- 143lb	65psi / 4.5bar
66-73kg / 145-161lb	80psi / 5.5bar	66-73kg / 145- 161lb	70psi / 4.8bar
74-81kg / 163-179lb	85psi / 5.9bar	74-81kg / 163- 179lb	74psi / 5.1bar
82-88kg / 181-194lb	90psi / 6.2bar	82-88kg / 181- 194lb	78psi / 5.4bar
≥ 89kg / ≤ 196lb	95psi / 6.6bar	≥ 89kg / ≤ 196lb	83psi / 5.7bar
≥ 96kg / ≤ 212lb	100psi / 6.9bar	≥ 96kg / ≤ 212lb	87psi / 6bar
On a 21mm rim: lower pressure by 0.3bar / 5psi		On a 21mm rim: lower pressure by 0.3bar / 5psi – On a 23mm rim: lower pressure by 0.4bar / 6psi	

Advice from other brands may vary, but Pirelli recommends riders who weigh over 96kg / 212lb should use 700 x 25c tyres or larger because the recommended tyre pressure for a rider of this mass would exceed the maximum permitted pressure for a 700 x 23c tyre.

As always, it's vital not to exceed the maximum pressures indicated on your tyres or rims.

How do Pirelli's recommendations stack up against what tyre pressures I personally use? Let's have a look at some examples.

To give these pressures some context, I weigh around 63 to 64kg.

Time trials are a personal favourite of mine. On my time trial bike, I use 23mm tyres on 19mm rims, but their actual inflated width is closer to 25mm. Given most time trials tend to take place on fairly good roads without too many potholes, I run around 90psi front and rear.

However, on my Giant TCR Advanced Pro 2, I'd typically be running 28mm tyres on 19mm rims. For this, I'd normally use pressures of around 65psi because the roads I ride on most often tend to have rough or broken surfaces.

Factors that influence optimal tyre pressure

As already noted, the above recommendations are intended as general starting points. They'll get you in the right ballpark, but there are a number of factors beyond tyre and rim size and rider weight that affect your personal optimum road bike tyre pressure.

Size matters

Accurately determining your tyre size is crucial to calculating optimum pressure.

Despite most bicycle tyres being labelled with a specific size, such as 700 x 25c, the actual inflated size of any given tyre will depend on both the design of the tyre and the internal rim width of the wheel.

Most new tyres are now designed around the latest 2020 ETRTO (European Tyre and Rim Technical Organisation) standards with a 19mm internal width, so wheels with an internal rim width wider than this will likely increase the measured width of a tyre when inflated to a given pressure (and vice versa).

The optimum pressure is, therefore, likely to be lower than if you were running the same tyre on a narrower rim.

System weight and weight distribution

While the rider makes up the vast majority of the total system weight – and, as we've already covered, a heavier rider will generally need to run higher pressures than a lighter rider – the weight of your bike and any kit you're carrying also count.

If you're riding a sub-4kg weight weenie optimized road bike and don't have it loaded up with heavy gear, then you might need to lower your tyre pressure by a few psi.

The opposite is also true. If you're riding a heavy touring bike or a road bike loaded with bikepacking bags, you may need to add more air to your tyres. With road bikes, the rider's weight is generally not evenly distributed across both wheels. The exact split will be different for every rider, depending on riding position and bike, but it's usually the case that the rear wheel takes slightly more of the load than the front.

As a rule of thumb, it's worth putting a few psi less in the front tyre than in the rear.

Road conditions

If you're riding on a perfectly smooth velodrome, higher pressures are faster. However, on imperfect surfaces, such as roads, very high pressures simply increase vibrations and can slow you down.

As roads get rougher, with bigger holes and bumps, the optimum tyre pressure decreases further.

When roads get very rough, smaller tyres (anything 25mm or smaller) running at a relatively low pressure may not be able to provide enough protection for the rim or inner tube – especially for heavier riders – which can lead to pinch flats or even rim damage.

Switching to larger tyres will give you a greater amount of tyre volume to play with, so you can fine-tune the pressure to account for both rolling resistance and comfort on rough roads.

This is why the pros switch to 28mm+ tyres for cobbled races such as the Tour of Flanders and Paris-Roubaix.

Weather and temperature

When road surfaces are wet, or if it looks like it might rain during your ride, it's worth dropping pressure by around 5psi on both tyres. This helps increase the amount of rubber in contact with the road, which should improve grip.

Higher temperatures, whether ambient or induced by rim braking, can also increase tyre pressure.

If you're riding long descents on hot summer days on a bike with rim brakes (particularly one with carbon clincher wheels or latex inner tubes), be careful to not over-inflate your bike's tyres. Doing so could lead to dangerously high pressures building up inside the inner tubes or tubeless tyres, if too much excess heat is introduced to the system.

Tyre construction

The materials and construction methods a road bike tyre manufacturer uses can also affect the optimum pressure, to a small degree.

Road bike tyres designed for racing or summer use tend to have casings that use a higher number of thinner nylon or cotton threads (this is what the Threads Per Inch or TPI number of a tyre refers to), and only a thin layer of rubber tread on top. This makes them easier to deform under pressure, making for a smoother and faster ride.

Conversely, winter road bike tyres typically have stiffer, more durable casings with fewer, thicker nylon threads. The rubber tread on top also tends to be thicker for improved mileage and puncture protection.

Given this, you may need to drop your road bike tyre pressure slightly when moving across to winter tyres because the optimum pressure for comfort and grip is likely to be a few psi lower.

Tubeless

If you're using tubeless tyres, it's worth remembering that the absence of an inner tube means you can safely run lower pressures without the risk of pinch flatting the tube.

Because lower tyre pressures can improve off-road grip, running tubeless tyres can be particularly useful if you're riding a road bike with relatively large tyres and looking to take in some light off-road or gravel riding.

Fine-tuning road bike tyre pressure

So, you have all the information at your fingertips, but how do you actually go about fine-tuning tyre pressure? The simple answer is experimentation.

Start with the recommendations above and then consider what the road conditions are like where you ride. Do you have miles and miles of freshly laid tarmac? If so, the above recommendations are probably close to optimal.

If you don't – perhaps because you live somewhere such as the UK – start with the above recommendations and experiment with taking a little pressure out of the tyres each time you go for a ride.

Start with small steps in pressure of around 5psi, and, if you pay attention, you should eventually be able to determine a sweet spot for speed and comfort.

You're looking for a pressure that feels smooth, without feeling like the tyre is collapsing underneath you when cornering. And, as already mentioned, erring on the side of too low rather than too high is a good thing to keep in mind.

Field testing

Alternatively, if you have an accurate and reliable power meter, you could do some basic field testing yourself.

Find a long, steady climb with an average gradient of over 5 per cent, and see how different tyre pressures affect the power required to ride at a certain speed, or how fast you travel for a set power output.

The data you acquire should enable you to hone in on an optimum tyre pressure for the setup and road conditions you're using when testing.

You're looking for the tyre pressure that requires the least power for a set speed, or enables you to travel fastest for a set power.

As with any testing, it's important to keep all other variables (e.g. system weight, riding position, traffic, weather, etc.) the same for each test run, otherwise, you can muddy the results.

Okay riders, see you next time. Until then,

Make Every Ride Epic,

Darryl