

# Optimizing Your Tire Pressure for Your Weight

by Jan Heine

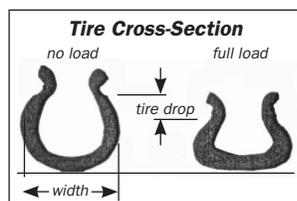
Inflating your tires to achieve 15% tire drop will optimize your bicycle's performance, comfort and handling. Our tests of tire resistance have shown that tire resistance is high at very low pressures. As pressures increase, tires roll faster, but the performance levels off at a certain pressure. Beyond this point, higher inflation brings only negligible performance improvements.<sup>1</sup>

## Optimum pressures

Riding your tires at this "cut-off" pressure optimizes both comfort and performance. At lower pressures, you roll slower. At higher pressures your bike is no faster, but much less comfortable.

Our tests of the same tires at various pressures determined the optimum pressure for each tire **for our rider/bike combination**. How does this translate for other riders and other tire widths?

I compared our results with Frank Berto's charts for tire drop, and found that the "cut-off" pressure corresponds roughly to a tire drop of 15%. Perhaps not coincidentally, 15% is the tire drop recommended by several tire manufacturers.<sup>2</sup> Tire drop is the amount the bicycle is lowered as the tires deform under the load of bike and rider.



## Tire drop

Measuring tire drop is not easy. Fortunately, Frank Berto already has done it for us. The chart below shows the pressures required for different rider/bike weights to achieve a tire drop of 15% with tires of various widths. Berto measured this for 700C tires, but the values apply to other tire sizes as well. Note that the weights are wheel loads, not the weight of the entire bicycle.

## Determining the wheel loads of your bicycle

Depending on your bike's weight distribution, achieving the optimal 15% tire drop may require different pressures in your front and

rear tires. To determine your weight distribution, place one wheel of your bike on a scale, the other on a block, so that both wheels are level. Have a helper hold your bike upright, and sit on your bike (with any load you will carry) in your standard riding position. The helper notes the reading of the scale. Then turn the bicycle around and repeat for the other wheel. Use these wheel load readings to determine your inflation pressure for each wheel.

As a first approximation, you can use the values we measured for a variety of bicycles:<sup>3</sup>

Bike	Load	Weight distribution	
		Front	Rear
Randonneur bike	front	45%	55%
Racing bike	-	40%	60%
City bike	rear	35%	65%

## Over- and underinflation

The table below shows that narrow tires require very high pressures, otherwise the tire drop exceeds 15%. On the other hand, wide tires do not require high pressures for optimum comfort and speed. Inflating tires to the maximum pressure recommended by the manufacturer tends to underinflate narrow tires and to overinflate wide tires.

## Conclusion

Tire pressures that correspond to 15% tire drop will optimize your bike's performance and comfort on average road surfaces. On very rough roads or unpaved roads, it may be useful to reduce the pressure. On very smooth roads, increasing the pressure slightly may improve the performance of your bike.

## Notes:

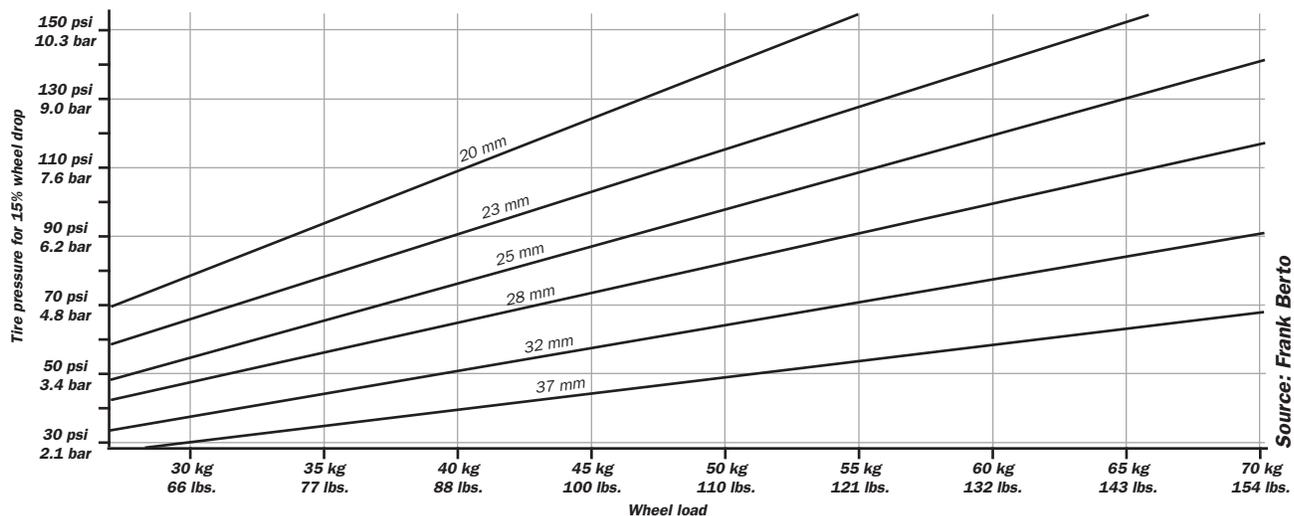
This article was reviewed by Frank Berto.

1 At higher pressures, internal losses due to flexing of the casing decrease, but suspension losses due to vibrating and bouncing of the bike increase. See Heine, J. and M. Vande Kamp, 2006: The Performance of Tires. BQ Vol. 5, No. 1, p. 1.

2 Berto, F., 2004: Under Pressure. Australian Cyclist March/April 2004, p. 48.

3 Heine, J., M. Vande Kamp, A. Wetmore and A. Spence, 2007: Optimizing Bicycles for Carrying Heavy Loads. Bicycle Quarterly Vol. 5, No. 3, p. 37.

4 For tires mounted on rims of appropriate width for the tire width.



Tire inflation for 15% wheel drop in relation to wheel load and actual tire width.<sup>4</sup> Example: Rider and bike weight: 100 kg. Weight distribution: 45%/55%. Wheel loads: 45 kg/55 kg. Tire pressures for 20 mm tires: 125 psi/155 psi. Tire pressures for 37 mm tires: 45 psi/53 psi. For heavy riders/bikes, narrow tires require very high inflation pressures, and wide tires are a better choice.