MANDATORY SAFETY DOCUMENT

The following information is important for the purchaser and user of Lew Racing clincher products (Pro VC-1 rims and wheels) to read and understand. If you are a bicycle dealer or if you purchase this product as a gift it is important to print this document and provide a copy to the user or to make this website page available to the user. The user must read and understand this document to operate his/ her equipment in a safe and reliable manner.

Tire Mounting

Mounting my tires is difficult. Is there a way to make them easier to mount?

If you're using Velox rim tape tire mounting may require tire levers. If you use tire levers, only Park TL-1 are allowed. Never use a screw driver or butter knife as a substitute for Park TL-1 tire levers. You can make the tire mounting easier by using the Lew Racing rim tape that was supplied with your Pro VC-1 rims or Stan Rim tape (www.notubes.com). Both are approximately .002 thick they make tire mounting much easier. Refer to the Clincher Tire Mounting Instructions located on the LEW RACING website. www.lewracing.com

Important information about tire pressure and performance.

Scenario #1

Mountain road ride

John decides to test the braking performance of his new Lew Racing Pro VC-1 wheels, so he drives his car to the top of the highest mountain near his town. When he arrives and mounts the wheels on his bicycle he carefully adjusts his brand new brake pads, double checks his brand new tires to ensure they are mounted properly on the rims. He checks the manufacturer's recommended maximum inflation pressure which is 8.5 bar (125 psi), and inflates his tires to 8.5 bar, careful not to exceed the maximum inflation pressure. John climbs aboard his bicycle and starts to pedal slowly. The first part of the descent is 5 -10% down grade and the wheels feel smooth. He touches his brakes and the braking is smooth and solid. Confident with the feel, John increases his speed, diving into the first switchback. Part way through the switchback he touches his brakes, pulling only with one finger and the braking is smooth and solid. Now, picking up speed on a straight portion of road, the down grade increases to 15 -18%, and John quickly accelerates to 50 km/h. He grabs the brakes near the bottom of this first steep descent before entering another switchback, and he quickly slows to 15 km/h. The braking is smooth and solid. He turns left into the first portion of the switchback and notices the smell of burning rubber coming from the brakes. He accelerates slightly, and then approximately 10 seconds later he turns right into the second portion of the switchback. As he turns right into the second portion of the switchback he hears a loud "bang". Next, without warning, he finds his front wheel giving away as he falls to the ground. He gets up to find the tire is still on the rim and appears undamaged. He examines his wheel and the wheel is in one piece, but the rim appears to have been damaged from skidding on the road.

What happened? John was careful as he prepared for his test ride down the mountain. John made one major and dangerous error in his preparation, and he ignored some important warning signs.

John over inflated his tires prior to beginning his ride. The maximum tire pressure printed on the tire was 8.5 bar and John inflated his tires to 8.5 bar. John failed to take into account that the heat generated from the friction of the tire on the road from the high-speed switchback corners combined with the heat generated from the friction of the brake pads would increase his tire pressure by over 2 bar (over 30 psi)! Add to that the hard cornering and the tire simply was pushed off of the rim enough that the inner tube could blow out. After the inner tube exploded the tire moved back into place on the rim, but because it was flat John had no traction and the carbon rim skid sideways in a violent manner across the road, causing irreparable damage to the rim.

What could John have done to make his test ride down the mountain safe? First, according to the maximum pressure marked on the tire, maximum means maximum. This value does not mean maximum before the ride begins, this means maximum—period. To exceed the maximum tire pressure at any time can cause the tire to explode or come loose from the rim in a way that causes the cyclist to suddenly lose control of his bicycle, just like John. John, based upon the steep descent should have only inflated his tire to 85-90 psi when he began his descent, expecting that his tire pressure would increase by over 30 psi. Many tires manufacturers mark a minimum and a maximum tire pressure on the tire. If they do not mark a minimum pressure on the tire, the major tire manufacturers' make recommendations on their websites. Find the information. It is your responsibility to understand the information necessary to safely operate your equipment.

Were there any warning signals? The burning brake pads were certainly a sign that critical materials were being overstressed. Other warning signals may in some cases be creaking, cracking, or popping sounds, possibly combined with a hot smell of burning or melting rubber. If you get any of those signals, stop immediately, and ensure your equipment is safe to ride before continuing.

Does this mean that if I inflate my tires to the maximum pressure at the beginning of the ride, and then the course requires significant braking or descending that I need to deflate my tires to ensure that I do not exceed the maximum pressure of the tire? The answer is YES.

I have never deflated my tires before to ensure that I didn't exceed the maximum recommended tire pressure, and nothing has ever gone wrong. Is there a reason why I have to do it with Pro VC-1 wheels or rims? You should always follow the guidelines as recommended by any equipment manufacturer. If you have violated the guidelines in the past and you have not had a mishap, you are fortunate.

Posted on the Lew Racing website is a white paper which explains in detail the testing that was done to ensure the safety of the clincher rims prior to their release. The white paper also explains the dangerous results if the guidelines are not followed which result in equipment failure. Included is a detailed chart showing the effect temperature has on tire fit and rim integrity.

Does this mean that I have to adjust my tire pressure at various points in the ride? The answer is NO. Know your course, plan your ride. You generally have an idea of the course so that you can make a cog and clothing selection. You know if the course is flat or contains climbs and descents. If the course is flat you will have less effect from the heat of the brake pads and road friction, than if the course contains climbs and descents. If the course contains climbs and descents inflate your tires to 30-35 psi below the maximum pressure to provide a safe margin for your tires to increase pressure, but not exceed their maximum limit.

What about races like triathlons where my bike is sitting in the sun heating up from the cold morning while I'm on the swim leg? Can a day that is a cold morning that turns into a hot afternoon create a tire pressure problem? The answer is yes.

The following is an excellent response reprinted from www.fitwerx.com

Scenario #2

Sunny day triathlon

I did the Milkman Triathlon in and it was quite hot. My tires say that maximum pressure is 120psi. I've heard that tires can expand and blow due to the heat. What should I inflate my tires to if it is really warm? What should I inflate them to if the temperature is moderate? I usually put about 100psi in, but sometimes a little more.

Also, how often should tires be replaced. How do I tell if they are wearing out?

Thanks for any info,
Karen Weatherby
kmweath@msn.com

Dear Karen,

Tires, more specifically the tubes inside the tire, can expand and explode due to temperature rise, so it is important to be aware of how temperatures change during a ride or race. Changes in the pressure of a tire initially inflated to 120psi are relatively small for each 10 degree change in temperature – about 2psi. So, what you really need to watch out for is dramatic changes of 20 degrees or more, which could cause a 5psi change in pressure or more. This type of a change is easier to create than you might think. An example:

You initially inflate your tires to 120psi on a cool morning (or in an air conditioned room or car) that is 65 degrees. You arrive at the transition area and the temperature is 80 degrees, a 15 degree change, and your pressure rises to slightly above 123psi. **By the time you get to your bike from the swim, the temperature has gone up to 90 degrees and your tires have been in the direct sun for ½ an hour or longer, raising the effective temperature to 110 degrees and your tire pressure to 130psi. By now, your tire that was initially inflated to 120psi may have exploded.** Pavement temperature, road friction, heavy braking and additional temperature rise could drive the pressure up even more and could lead to a dangerous blow out on the course.

A quick ballpark way to figure out what the pressure change will be on a tire is to add approximately 2psi of pressure change to your starting pressure for every 10 degrees of temperature rise. For the technophiles that want to figure the pressure change more exactly, use Guy-Lussac's Law [at constant volume, pressure is directly proportional to absolute temperature (P1/T1 = P2/T2)]. Absolute temperature is figured by taking the current temperature and adding 460 to it. Using the example in the paragraph above, the solution would look as follows:

Initial Pressure (P1) – 120psi

Initial Temperature (T1) = 65 degrees + 460 = 525 (absolute temperature 1)

Final Temperature (T2) = 110 degrees + 460 = 570 (absolute temperature 2)

Final Pressure (P2) would therefore be found by solving for P2 in the following: 120/525 = P2/570 (0.228571429 = 0.228571429 * 570 = 130.3psi).

You should check your tire pressure before each ride. If you are concerned about blowing a tube or tire because of temperature changes, inflate the tire as close to the ride, and in the same environment as the ride, as possible. For a triathlon, it would be a good plan to let your bike sit in the transition area for awhile to adjust to the ambient temperature and then inflate the tires. If you know that the temperature of the tire is going to rise, because of an actual change in temperature or from heavy braking, etc., subtract

out the amount of expected temperature change and do not inflate to more than the recommended max psi minus this amount. In the example above, the maximum you would initially inflate to is 110psi.

What is your optimal tire pressure? There is not simple or direct answer to this as your weight, frame stiffness, tire width and model, and the riding conditions for the day are all influential and important variables. Some general guidelines are as follows:

- Lighter riders, especially those riding stiffer frames, will want to run slightly lower tire pressures than a heavier rider – between 100-115psi range with most clincher tires.
- Heavier riders will usually benefit from slightly higher tire pressures than lighter riders – often in the 110-130psi range with most clincher tires. Bigger riders may want to also consider riding a slightly wider tire (say a 700x25 instead of a 700x23). This can increase comfort while actually decreasing rolling resistance.
- While some tires, especially tubulars, have very high maximum psi ratings, riding a tire pumped to 190psi, will not only create a harsh ride, but often will actually increase rolling resistance and decrease traction. Stay within a reasonable range, regardless of what the tire can handle, and **never exceed the maximum psi.**
- Do not under inflate. Under inflation leads to more flats than over inflation. You would be hard pressed to find a situation where running under 100psi or over 140psi on a performance oriented 23c tire would be beneficial.
- If the conditions are wet, consider running a tire pressure about 10psi lower than normal.

How often should you replace your tires? Tires wear out for two primary reasons. The first is road wear and the second is environmental wear. Road wear will vary markedly depending on the tire's rubber compound and the rider's weight and riding style. Because there more weight on the back of the bike, rear tires usually wear quicker than front,. Inspect your tires regularly, and if you notice that your tire is developing a long flat section to it, consider replacement. If you see threads from the casing or large slits or holes, replace immediately. Heavier riders usually wear through tires quicker than lighter riders, so choose your brand and model of tires accordingly. Environmental factors also influence tire durability. Ozone, oil, road salt and direct sunlight are all rough on rubber and can lead to cracking and sidewall deterioration. To extend tire life, make sure that you do not store your bike in direct sunlight or too close to ozone producing equipment such as freezers or air conditioning units. If you ride in wet conditions, especially early season in the snow belt, clean your tires with water when you are finished to get rid of any petroleum based products or salts that could dry out or eat your tires.

If in doubt, have a good bike mechanic review your tires periodically.

Have a great season and train hard.

Ian

Jobst Brandt is a well respected cycling expert and author. Here are some of his comments.

Subject: Blowouts and Sudden Flats
From: Jobst Brandt
Date: August 11, 2004

Bicyclists often report tube failures that they believe occurred inside a tire casing. They believe these are blowouts caused by faulty tubes that split or were cut by the rim tape. However, they also heard a bang, after which the tire was flat. On removing the tire casing from the rim with tire irons, the burst tube is found to have a long slash.

If there was an audible bang, then the tire was off the rim, exposing the inner tube. However, the undamaged tire usually remains on the rim because tires usually fall back into place after exposing a tube. A tube cannot blow out inside the tire with a bang, because a bang is caused by a sudden change in volume, an expansion. Such an expansion is not possible within a tire casing that is essentially air tight.

The resulting clean slash in the tube cannot occur from rim tape that would cause a gradual failure along an abraded line extending beyond the end of the split. A burst into a spoke hole in the rim would cause a starburst hole that is smaller than the rim socket because the tube shrinks when no longer inflated.

Tire blow-off occurs most commonly where substantial energy of descending mountain roads is converted to heat in rims by braking. Rim heating with rim brakes on continuous steep descents can increase inflation pressure substantially. For this reason some mountain passes in the Alps prohibit descending by bicycle while up hill riding is permitted. For instance, Zirlerberg between Zirl and Seebach (Innsbruck), a major road between Germany and Austria, is one of these. The road has several runaway tracks for motor vehicles with brake failure.

Okay, so I've read the warning. I understand the importance of monitoring my tire pressure for safety, but when I race I want to make sure my tire pressure is VERY high for the lowest possible rolling resistance, and I know the conditions will be extreme with steep descents and hard braking. What advice can you give me? If I only exceed the maximum recommendations once or twice a month is it a problem? You should NEVER exceed the maximum recommendations—period. If you want a true race wheel and tire, do what the pros do—race tubular wheels. They are not susceptible to blow-outs. High quality tubular tires will handle 180 psi with no problem. Furthermore, if you flat the tire stays glued onto the rim providing traction between the rim and the road surface.

Additional important information regarding wheel building is available at www.lewracing.com.