



VO₂ MAX Intervals

By pushing your VO₂ MAX, you increase your body's ability to utilize a larger volume of oxygen thereby increasing energy creating capacity. The greater the energy creating capacity, the greater the power output.

There is a proper way to do VO₂ Max intervals and an improper way. Many cyclists learn how to do intervals improperly, thus gaining the least out of their hard work, and making intervals uncomfortable beyond necessity.

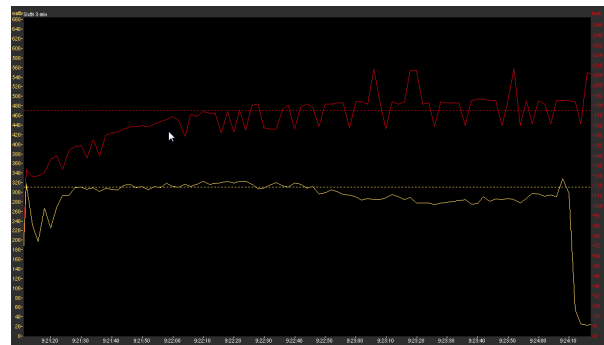
This is not to be misunderstood—there is a certain level of discomfort a cyclist must achieve to push the boundaries of their aerobic ability, and to improve upon that ability. Yet, when conducted properly, VO₂ MAX intervals achieve better results if they are paced properly; that is, not an all out effort from the start.

IMPROPER VO₂ MAX INTERVALS

Most cyclists approach VO₂ MAX intervals as “hard work.” In thinking that, cyclists start each interval as hard as they can and go until they cannot go anymore. Then, they try to do their next intervals as hard as they can, until they cannot do anymore intervals. That mind

set and approach does not provide the most benefit.

Here is an example of data that shows an improper VO₂ MAX interval:



Improper 3-minute VO₂ MAX Interval

The solid yellow line denotes power, and the dashed horizontal yellow line denotes threshold power. The solid red line represents heart rate, and the dashed red line denotes anaerobic threshold heart rate. Notice the jump at the start over threshold power, followed by another surge over threshold for a short period, then a drop off of power below threshold for the second-half of the interval. Heart rate remains above threshold for the entire interval, despite decreasing power.

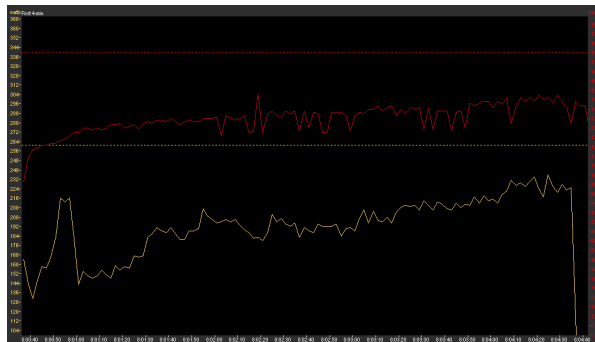
This is a common mistake. The athlete started too hard, tried to recover with another hard

surge, but at that point he had “cracked” His heart rate drifted higher to cover the oxygen debt caused by the earlier hard effort, yet his steady-state power slowly decreased throughout the remainder of the interval.

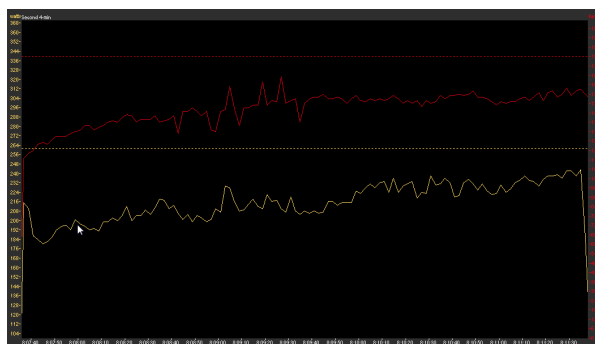
PROPER VO₂ MAX INTERVALS

VO₂ MAX intervals should be paced *within* them and *between* them. This means, each individual interval should have a progressive build throughout the VO₂ MAX interval period (usually 3 to 4 minutes), and each successive interval should be at a slighter harder effort producing a build throughout the interval set.

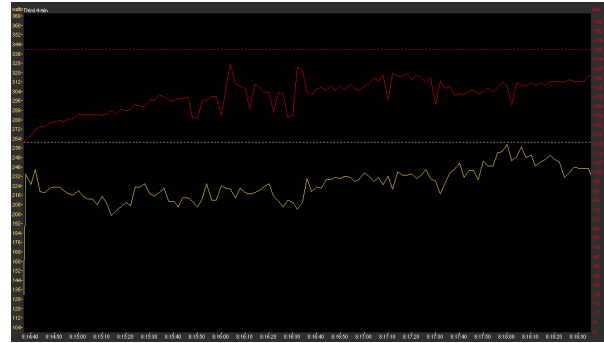
Here are examples of data from a proper set of VO₂ MAX intervals:



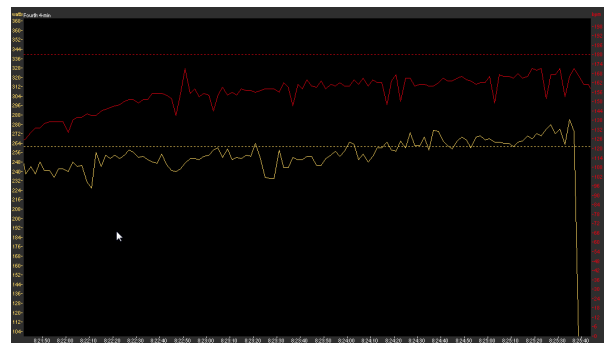
First 3-minute interval



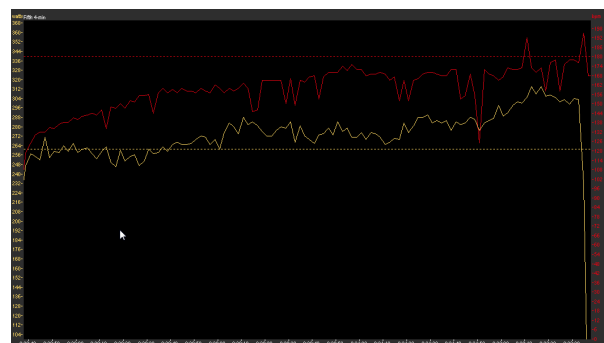
Second 3-minute interval



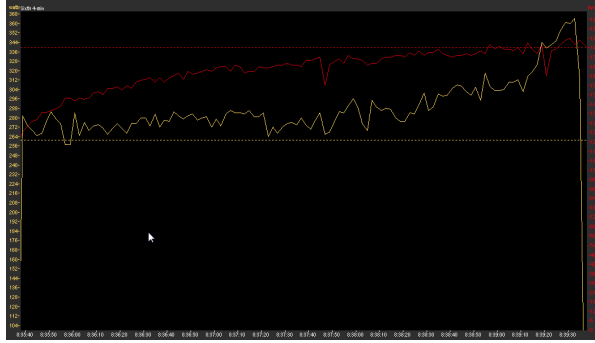
Third 3-minute interval



Fourth 3-min Interval



Fifth 3-min Interval



Sixth 3-min Interval

Proper 3-minute VO₂ MAX Intervals

Notice *within* each interval, the athlete's power and heart rate start lower than his ending targets. He does not reach his ending target heart rate and power until the last half of the interval. Overall, he performs more work—especially related to power—and the intervals are much more manageable discomfort-wise.

Notice *between* intervals, the athlete's power and heart rate increase from one interval to the next. The athlete's first 3 intervals show power and heart rate below, but near his threshold, while his last three intervals, show power and heart rate above and beyond his thresholds. If he had performed the first 3 intervals, above his threshold, it is not likely that he would have been able to go beyond or even near threshold for the last 3 intervals. Overall, the athlete performed more total work—especially related to power—for the entire session.

This point is especially poignant in the fourth interval, where the athlete is able to achieve his power threshold without pushing his heart rate to its threshold. Essentially, by performing intervals properly, in the fourth interval the athlete is able to achieve greater power at lower heart rates. This is the desired end result of performing VO₂ MAX intervals!

PERFORMING VO₂ MAX INTERVALS

Find a road with limited stop signs, traffic lights, traffic crossings, in which you can conduct 3- to 4-minutes of uninterrupted hard work. An excellent location is a closed road with a grade of 3 to 5%. You want the terrain to provide a forum for sustained power.

An ideal modality is a stationary trainer using a power meter, because you don't have to worry about cars, inclement weather, changing winds, rolling terrain, and the work is highly repeatable.

Plan on attempting a minimum of 4 VO₂ Max intervals and maximum of 6 VO₂ Max intervals. Each interval should be performed with a cadence of 85 to 105 rpm. A good guideline is your time trialing cadence, as these intervals will push you up to (and ideally through) your time trial heart or power. It may be helpful to start at lower cadences and build your cadence throughout each interval.

Use the graphs above as guidelines for approaching the intervals. For example, the first interval may achieve 80% of maximum heart rate, the second, 82% of maximum heart rate, and the third, 85% of maximum heart rate. Your average heart rate over 30-minutes of all out effort is a pretty good guideline for your 90% of maximum heart rate.

Similarly, the first interval may achieve 90% of 30-minute threshold power, the second, 92% of 30-minute threshold power, and the third, 95% of 30-minute threshold power. Your average power over 30 minutes of all-out-effort is a pretty good guideline of your 20K and 40K time trial power.

The fourth, fifth, and sixth VO₂ Max intervals should be near or above 90% of maximum heart rate or 100% (or above) of 30-minute threshold power.

As discussed earlier, remember to pace *within* each interval and *between* each interval, to maximize the amount of work you can achieve.

Recover actively for the same amount of time as the interval—the terminology being “recovery is 1:1.” Thus, 4 minutes of interval work should be followed by 4 minutes of active recovery. Active recovery heart rate is <75% of maximum heart rate or <2 watts per kilogram with cadences from 70 to 90 rpm in an easy gear.

CONCLUSION

VO₂ MAX intervals are an essential part of all competitive cyclists’ regimens. By pushing your VO₂ MAX, you increase your body’s ability to utilize a larger volume of oxygen thereby increasing energy creating capacity. If paced properly, VO₂ MAX intervals will deliver the greatest quality work over time.