

Why were the new lipo battery rule addendums put in place?

8.3.2.5.3 Li-Poly battery maximum charge rate shall be 1C. C= charge amp rate. Charge amp rate = mAh capacity/1000=XAmps.

Lipo charge rate has come under ROAR scrutiny at several large races and many club racing venues around the country. We would like to present the plain and simple facts about charging your lipo packs in excess of 1C:

- 1) Each charge of a Lipo pack beyond the 1C rate causes irreversible damage to the pack.
- 2) Continued charging in excess of 1C will severely shorten the useful cycle life of a Lipo pack by as much as 90%.
- 3) Continued charging in excess of 1C increases the risk of a destructive pack failure each time it occurs.
- 4) Charging in excess of 1C **increases** the internal resistance of the cells which reduces their performance capability.

As you can see, not only are there are many negative destructive effects of charging in excess of 1C, there are **absolutely no positive benefits to performance whatsoever.**

This new addendum was added primarily for the safety of our membership and member tracks, but also to protect our members from needlessly reducing the lifespan and performance characteristics of this new long lasting and economical (if not abused) power source.

8.3.2.5.4 Maximum temperature for a charged li-poly battery pack shall be ambient temperature +/- 5 deg.

8.3.2.5.5 The use of heating devices of any type to heat a li-poly battery is strictly prohibited.

8.3.2.5.6 The use of cooling device and or freeze sprays of any type to cool a li-poly battery is strictly prohibited.

It has been known for many years that Lipo packs have an optimum discharging temperature of about 110degF. This means that a pack at 110degF will maintain higher voltage under load (due to lower internal resistance) than the same pack started at 70degF. The pack started at 110degF also tends to gain less heat during the discharge and finish the discharge cooler than the pack started at 70degF when discharged near its full capability (again a function of lower internal resistance). Warming lipo packs to or near their optimal discharge temperature has also shown positive benefits to their cycle lifespan (how many times they may be charged and discharged before showing degradation in performance, which signals the end of their useful life).

Why then is warming not allowed when there are so many positive benefits? For several important reasons that were very carefully considered over the course of observing the first year the technology was being approved and used by a large portion of our membership on a large portion of our member tracks.

- 1) It was determined that the "tools" racers were using to warm their packs were in most cases inadequate to accurately maintain a beneficial target temperature. We have seen hot plates intended for cooking use, various body heating pads and electric blankets, and even homemade apparatuses. While the majority of these "tools" in the properly educated hands of a lipo expert could be used safely, the fact remains that the rest were inherently dangerous and posed a serious safety risk to the user and all those near him/her. In addition, "lipo experts" are still few and far between in the racing community.

So in general, the heating methods observed combined with the overall experience level of those employing them pose a serious safety risk.

- 2) Another danger commonly observed was the fact that only a small minority of users truly understood why they were heating their packs in the first place – beyond being told somewhere that it “increases performance”. We at ROAR recognized at the outset of publishing the initial lipo rules in the 2008 rulebook that the rules themselves were very secondary to the more important task of educating our membership about the exact do’s, don’ts, and the explicitly delineated safe minimums and maximums for not only temperature, but voltage and charge rate as well. The maximum safe temperature that a lipo pack should never exceed is 140degF. This guideline appeared in the 2008 rulebook. Heating right to, and beyond that maximum safe temperature has been observed across the country during this past year. So while heating to 110degF represents the limit of being beneficial and heating to 140degF or beyond is immediately destructive to the pack, this simple clinically proven truth is even now unfortunately being debated publicly. So simply stated, ROAR believes the collective knowledge base of our users and tracks is still lacking (despite our educational efforts) in the critical understanding of heating and its positive effects in order for it to be used accurately and beneficially, rather than destructively at the peril of the member and member track.
- 3) ROAR continually seeks to encourage the most fair and economically feasible racing possible. Heating lipo packs clearly increases performance, but from the above it’s also clear that the devices employed to do so come at an extra expense to the racer, as well as being difficult to regulate with any precision. This cost factor combined with yet one more factor potentially limiting performance unless extra costly and time/enjoyment reducing measures are taken by the budget racer, weighed heavily in the decision to essentially disallow any heating whatsoever.

So the summary of the situation is: ROAR believes that despite its benefits, lipo pack heating cannot be allowed for the reasons of competition, cost, safety, and current member knowledge base.