

# Can ETS Z85 Fuel Gain You Significant HP? We Tested It To Find Out

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E85 fuel is a popular choice among many performance enthusiasts, thanks in part to its cooling capacity, higher octane rating — meaning more horsepower when tuned appropriately — and its slightly lower price at the pump versus gasoline. Add to that increasing availability at fuel stations nationwide and it's easy to see why the share of hot rodders and racers burning these ethanol blends is on the rise.

E85, of course, is an abbreviation referring to the blend of 85-percent ethanol fuel and 15-percent gasoline or other hydrocarbon, by volume. However, the quality of the chemical makeup of the fuel itself, along with the exact ratio of ethanol to hydrocarbon at any given pump can vary — in fact, the ASTM 5798 standard specifies the allowable ethanol content in E85 can range from 51- to 83-percent. So, likewise, performance can vary. Nevertheless, the vast majority of those running E85 rely on what they can get right out of the local pump, largely due to availability and cost. But just as drag racers typically utilize high-octane, dense racing gasoline rather than pump gas in their vehicle to achieve more horsepower, E85 users can also turn to specialized fuels designed for the very purpose of competition.



And that's precisely what ETS Racing Fuels, an emerging brand in North America, set out to do with its Z85 PERFO ethanol blend racing fuel. Founded in France in 1989, ETS first arrived in the United States in 2007, where its North Carolina offices joined other

manufacturing and distribution facilities located around the world. Today, the office based in Michigan and storage hubs through the country offer a range of racing fuel products, including the Z85 PERFO fuel that we recently put to the test.

Z85 Perfo, an unleaded E85-like gasoline, has an octane rating of 93.5, contains 30-percent oxygen, and has a density of 804.5 mg/m<sup>3</sup>, all of which add up to a fuel far more capable than typical pump E85. And that was the goal, as ETS's chemists and engineers painstakingly worked to develop a combination of molecules that produce more power and torque, with other added benefits of a fuel created under such a microscope and with stringent manufacturing tolerances.

The exact mixture and makeup of the molecules and compounds, is of course, a secret kept under lock and key at ETS and would fly right over the head of most hot rodders anyhow, but its team is confident it has a superior product in Z85 Perfo.

From a chemistry standpoint, our fuel is magnitudes better than gas-station E85...it's not one or two percent. And so it then begs the question of whether you're concerned about cost or about performance? – Bill Bovensiep, ETS Racing Fuels

“When we set out to develop this fuel, our goal was to offer something much better to our customers in terms of its formulation, and not just compete with our competitors on price. This fuel is a mixture of ethanol, gasoline, and other compounds developed to deliver added performance. The aim was to make a fuel similar in terms of oxygen content to traditional E85, but by tweaking the formulation and using ethanol and other oxygenated components and different hydrocarbon molecules, we were able to create more horsepower,” said ETS's Yann Labia. “One of the advantages of Z85 PERFO compared to other E85 fuels is the consistency, because we're only using pure molecules, so batch after batch will always have the same chemistry. This ensures consistency in performance and reliability of the engine. So tuners can perform very precise engine mapping because they always get the same mixture.”

The octane rating was important to ETS, which is established through the makeup of the blend. “The strategy was to deliver more power by producing more energy from the molecules of the fuel, and by making the combustion speed much faster,” Labia adds.

Make no mistake: ETS didn't reverse engineer pump E85, but instead utilized pure molecules to develop Z85 from the ground-up. It therefore knows with great precision how tweaking the molecules in one way or another with positively or negatively affect the performance of an internal combustion engine.

“E85 has upwards 85-percent ethanol, but all of the things that make up that other 15-percent make a big difference,” ETS's Bill Bovensiep explains. “These other components can be comprised of gasolines or other oxygenates, other chemistries, in addition to additive packages inside there — anti-frictional and anti-oxidatives, for example,” Bovensiep explains. Getting a little technical, ETS's chemists dive into the molecular hydrocarbon chain of the

gasoline components and select them according to the density of the molecules, their anti-knocking properties, and their specific combustion speeds and energy release. ETS creates the best match between all the molecules to produce precisely the fuel it wants that maximizes combustion. This is also why the consistency is there: because it always pulls the same high purity molecules to produce every pale and drum of fuel.



“From a chemistry standpoint, our fuel is magnitudes better than gas-station E85...it’s not one or two percent. And so it then begs the question of whether you’re concerned about cost or about performance? E85 is not terribly expensive at the pump, but if you just change the fuel, you can overcome a lot of expense in other areas trying to boost your engine to get that same amount of power out of it,” Bovensiep adds.

E85 typically burns at rate of 1.4 times that of unleaded gasoline, and Labia confirms its Z85 PERFO is virtually equal in consumption to pump E85, but provides much power.

If you’ve been in this hobby for long you’ve no doubt read a lot of technical jargon and marketing speak — not unlike what you just read above — about racing fuels, but ultimately, the true value and merit of any product lies in whether or not it ultimately performs. So we put it under our own microscope.



## Putting The Z85 PERFO To The Test

Putting The Z85 PERFO To The Test Last summer, Adam Hodson, Nick Taylor, and their team from Indiana's Mid America Kustoms (MAK) dominated the Horsepower Wars \$10K Drag Shootout in their turbo-LS-powered Chevrolet S-10, known as "Gap Train" — a reflection of their years of no-prep drag racing experience and familiarity with the GM LS engine platform. In the months since, they've flogged "Gap Train" at no-prep races and even survived a blistering-hot Rocky Mountain Race Week. When they're not racing, Adam and Nick are fine-tuning customer cars on their shop's hub dyno, and they can easily identify the effects of a fuel on output.

To see what ETS's Z85 PERFO is made of, MAK put the fuel through the stock-bottom-end, aluminum 5.3-liter engine that's boosted by a 91mm turbocharger at upwards of 30 psi.





MAK first tested the fuel in the field on Rocky Mountain Race Week, where temperatures soared well above 100-degrees and density altitudes got as high as 10,000-plus-feet in the Colorado mountains. Despite all that, the duo cracked off personal best 60-foot and 1/8-mile times, as well as finish-line trap speeds.

“Right off the bat we found the truck started up noticeably quicker with the Z85 in the tank. The exhaust note was also much stronger sounding and had more pop to it. The throttle was also much more responsive and crisp,” Hodson begins.

“We started with our standard pump E85 tune, which we run a little rich for the stock-bottom-end to keep it happy,” Adam continues. “The timing is also a little safe, for the same reason. The AFR on 30 psi was originally 11.2, and I leaned it out to 11.4 and it immediately picked up 2 MPH. For it to immediately respond like that was huge. The timing looked good on the plugs, so we started ramping timing in; I think we started the week about 14.5-15 degrees, and the last pass of the week I had 20 in it, and that’s nuts. We ended up turning it up to 34 psi, and I still had 18-degrees in it. With pump E85 and with an engine like this, that would be super risky. But it just loved it.”



Adding to his earlier comment on the exhaust note, Adam said, “The motor sounds more aggressive on this stuff. We drove the truck all week so you get used what the exhaust sounds like since it’s in your ear all the time; when I put the Z85 in there, it sounded like it went from an 8:1 motor to a 12:1 motor. I never would have believed it if I hadn’t tried the fuel myself. It sounds meaner, nastier, it runs crisper, and it needs less fuel.”

Back home, Hodson bolted the S-10 up to the shop’s hub dyno to find out if the positive experiences on the racetrack translated to very real power and torque numbers. First, they performed a pull on corner-store pump E85, with the engine at an 11.4 AFR, 16.9-degrees of ignition timing, and 30.5-pounds of boost; that run netted 1130 horsepower at 7075 RPM, and 860 lb-ft of torque at 6775, for a baseline for this test.

The pump E85 was then drained and the Z85 PERFO was poured in the tank and run at the very same air/fuel, ignition, and boost parameters. The result? An impressive 1160 horsepower at 7150 RPM, and 865 lb-ft of torque at 6900 RPM, for a net gain of 30 horsepower. Taking into account all the variables being equal, that gain proves the merit of the Z85 PERFO in a side-by-side, direct comparison to your run-of-the-mill pump E85.

**Editors Note: the second Z85 pull, registering 1350 HP, required re-calibration of the dyno, with the adjusted result 1242 HP.**

But as ETS explains, Z85 PERFO has a higher specific gravity (density) than other E85 fuels, meaning racers will have to adjust their engine’s engine air/fuel ratio and spark advance timing because of the faster combustion. That meant the initial gain of 30 horsepower was only the appetizer to the main course in this test.

The burn rate of Z85 PERFO would typically require retarding the ignition, however, Hodson found it advantageous to dial a single degree of advance into the LS engine to produce maximum benefit, simply because they had already been running a conservatively-low ignition timing to go easy on the stock rotating assembly parts. With the AFR again at 11.4, the boost left alone at 30.5 psi, and 18.3-degrees of timing dialed in, “Gap Train” produced 1242 horsepower at 7125 RPM, and 951 lb-ft of torque at 6675, for an improvement of 82 horsepower and 86 lb-ft of torque — all from little more than a change of fuel and a couple of minor optimizations to the tune.

The three dyno pulls (from L to R). The SBE 5.3L LS produced 1130 horsepower on pump E85, 1160 on Z85 PERFO, and 1242 on Z85 with a little over one degree of additional timing advance dialed in. There were also torque gains across the spectrum, which was most noticeable on the final pull, where we gained more torque than horsepower even. One final pull was made with the ignition timing dialed up an additional degree of advance, but it was there Hodson found the backside of the sweet spot for the Z85 PERFO, as power output fell back to 1135 horsepower.

With the Z85, MAK found it could safely add 2-3 more degrees of timing to the engine without displaying signs of detonation, all while increasing horsepower. “With this engine being a SBE (stock bottom end) combination we are always very careful with timing, as this is often what destroys them by bending rods or breaking pistons,” Adam explains. “The maximum timing we used on pump E85 was determined by the timing mark on the strap. The timing mark was safe and just past the middle of the strap before the bend. With Z85 we were able to add two more degrees with no real movement in the timing mark. On the same timing, the Z85 made 30 more RWHP and with just one degree advanced made 82 more RWHP. While we could have possibly added one more degree of timing to the pump E85, from past experience know we were at the edge of a safe timing number. But the Z85 and its ability to resist detonation much better than pump E85 gave us the confidence to add more timing.”





Hodson shares that the plugs were still easy to read as compared to pump E85, noting “the color tint was a little darker but still showed a strong defined timing mark.”

Overall, Hodson says the Z85 PERFO was much happier at a leaner Target AFR, resulting in a snappier throttle response and the aforementioned 2 MPH increase at the track.

In terms of the all-important tuning window, Hodson commented, “the tuning window is much larger with the Z85, which can be a really nice thing with a stock-bottom-end engine. The detonation resistance of the Z85 allows the tuner to be much more aggressive with the tune-up with less fear of hurting it.”

The Z85 PERFO did require between 3- and 5-lbs/hr more fuel to meet the same target at idle and during acceleration. At WOT (wide-open throttle) under 30.5 psi of boost it required 50-60 lb/hr more fuel at a lower target AFR than pump E85. In both cases Adam says he believes that this shows a few things: first, the purer ethanol blend of the Z85 just naturally will require more fuel since the ethanol content is higher; second, the engine is happier and making more horsepower with the Z85. The increased horsepower is part of the increased requirement in fuel consumption.





All in all, there's not much more to say now that ETS's Z85 PERFO has done all of the talking. We found an improvement of 30 horsepower by simply changing the fuel (this will obviously vary by vehicle, since optimization for the fuel is key) and a stones throw from 100 horsepower with some small tweaks to the tune, all while delivering more reliability, a wider tuning window, and the comfort in knowing that every batch is consistent. As a premium product, Z85 PERFO of course carries a price premium to pump E85, but as Bovensiep already posed, in a performance application, even a few horsepower can be the difference between winning the losing. Consider the time, effort, and cost would it take to gain 30 horsepower, much less 80, in other areas of your engine, and investing in a fuel designed with the sole intent of giving you more performance is a no-brainer.