

Aerodynamics on Camaro Z/28 Generate Downforce for Greater Stability at Speed

The Camaro Z/28 is more than just a simple muscle car.

GM engineers have used sophisticated designs on the 2014 Camaro Z/28 to manage airflow in a way that few other production vehicles use, said GM spokesman Monte Doran.

This engineering technique generates downforce like a race car to press the tires against the track for high-speed stability and greater cornering capability.

Numerous modifications were made to the exterior, compared to the Camaro SS, with new and revised content developed to improve aerodynamics, powertrain cooling and brake-system cooling, Doran said. They help the Z/28 produce 440 pounds more downforce at 150 mph, relative to the SS, which generates slight lift at that speed.

Computational fluid dynamics, reduced-scale rolling wind-tunnel testing, full-scale clay models and full-size prototypes were tested in several wind tunnels, including General Motors' wind tunnel in Warren, Doran said, resulting in five primary contributors to the Z/28's aero supremacy:

- **Front splitter** – The Z/28's front splitter is a large aero panel that provides downforce at the front of the car, enhancing cornering capability and high-speed stability. It's designed to withstand 250 pounds of downforce at its tip and is matched with an aero closeout panel under the front of the engine compartment that also enhances aero characteristics – along with molded-in aero features forward of the front wheels;

- **Rear spoiler with "wickerbill"** – At the outset of development, the aerodynamic coefficient of drag goal was achieved with original Camaro SS content and an accessory rear spoiler, but to meet the downforce requirements for Z/28, the rear spoiler was modified with a "wickerbill" – a small, vertical tab at the edge of the spoiler. Although an aesthetically minor change, it adds approximately 28 counts of drag, improving rear lift performance by 70 counts. That allows the Z/28 to handle turns at higher speeds and deliver greater overall high-speed stability;

- **Hood extractor vent** – A functional carbon fiber hood extractor provides increased engine cooling by allowing hot air an exit route, but also plays an important role in the car's aero performance. It provides a path for air channeled through the grille to exit out the hood and over the car. Without the vent, the air would be pushed out the

bottom of the engine compartment, which could generate lift. The design is similar to the extractor featured on the Camaro ZL1;

- **Rockers, wheelhouse extensions and front tire deflectors** – Specific rocker moldings provide aggressive styling and improved aerodynamic performance, while unique wheelhouse extensions cover the Z/28's wide tires to push air past the tires. Deflectors at the bottom-front corners of the front wheel flares also contribute to the car's downforce-producing aerodynamics, taking the place of a conventional air dam;

- **Belly pan** – The Z/28 underbody incorporates a belly pan that helps reduce front lift. It was developed using computational fluid dynamics and wind-tunnel testing. Along with the aero benefit, it also contributes to drivetrain cooling, with modified NACA duct profiles designed to draw air into the underbody tunnel area, where the highly energized air provides extra cooling for underbody components affected by the exhaust thermal energy of the LS7 engine. Unique wheelhouse liners with closeouts work with the vehicle underbody for optimal airflow, too.

Additionally, the Z/28's special front fascia plays an important role in airflow management, Doran said. It is based on the Camaro SS, but the fog lamps, air dam and the upper-base grille are replaced with covers for deleted fog lamps (to reduce weight), an air duct support bracket, an airflow-optimized upper grille for enhanced cooling and a modified fascia lower inlet that incorporates provisions for the brake cooling ducts. They funnel air from the splitter/lower grille through the ducts to the brake rotors and calipers.

The aerodynamically optimized design helped the Camaro Z/28 log a lap on Germany's legendary Nürburgring road course that was four seconds faster than the Camaro ZL1's, and beat published times for the Porsche 911 Carrera S and the Lamborghini Murcielago LP640.

"Most production cars are designed with some lift at speed in order to slip through the air for greater fuel economy, but the all-new Camaro Z/28's track-oriented purpose dictated an entirely different take on airflow management," said Tom Froling, lead development engineer – Aerodynamics.

"Its carefully tailored aerodynamics package generates downforce for greater handling stability at speed, and the grilles are optimized to meet stringent cool-

ing flow and brake-cooling requirements."

The new Camaro Z/28 is the fastest factory-produced Camaro ever on a track, with improved speed coming from three areas:

- **Increased grip** – The Z/28 is capable of 1.08 g-force in cornering acceleration, due to comprehensive chassis revisions;

- **Increased stopping power** – The Z/28 features Brembo carbon ceramic brakes capable of 1.5 g-force in deceleration, and consistent brake feel, lap after lap;

- **Reduced curb weight** – The naturally aspirated Z/28 weighs 300 pounds less than the supercharged Camaro ZL1, with changes ranging from lightweight wheels to thinner rear-window glass.

Power comes from the 7.0L LS7 engine, rated at an SAE-certified 505 horsepower and 481 lb.-ft. of torque. A close-ratio six-speed manual transmission is the only transmission offered and power is distributed to the rear wheels via a limited-slip differential featuring a helical gear set, rather than traditional clutch packs, for optimal traction.

"It's a track-proven, uncompromising collection of hardware that generates the Z/28's power and channels it to the ground, but it's the way the Z/28 manages airflow that truly helps it stick to the track to make it fast and stable at speed," said Froling.

"None of the car's unique exterior elements is without a performance-enhancing purpose. In fact, it shares several racing-inspired aero features from various Camaro and Corvette race cars."

The 2014 Camaro Z/28 arrives in dealerships next spring, ready for the 2014 racing season.

Ford to Recall 2013 Escapes in January

By TOM KRISHER
AP Auto Writer

DETROIT (AP) – Ford is recalling the Escape small SUV again, this time to fix oil and fuel leaks that could cause engine fires.

The hot-selling SUV has been recalled seven times since it was redesigned and went on sale in the spring of 2012.

The first of two recalls announced last week affects more than 161,000 Escapes worldwide from the 2013 model year with 1.6-liter four-cylinder engines.

Ford says the cylinder heads can overheat and crack, causing oil leaks.

Of those SUVs, fuel lines on about 12,000 may have been installed incorrectly. They could become chafed and leak gas. Many were repaired under a previous recall. Ford says the oil leaks caused 13 fires but no injuries. There haven't been any fires from the fuel line problems.

In documents filed with the National Highway Traffic Safety Administration, Ford said it began to get engine fire reports on Escapes in late August, and began investigating. Eventually, it was able to duplicate the cylinder head cracking and decided to do a recall. During the investigation, Ford also found warranty claims of fuel line leaks and decided to repair them as well.

In some cases, the fuel lines may have been installed incorrectly by technicians in a previous fuel line recall, the documents said.

Auto safety advocates say the high number of recalls is out of the ordinary for a new model and a sign of quality problems.

But Ford spokeswoman Kelli Felker disagreed. "We're committed to providing our customers with top-quality vehicles and are equally committed to addressing potential issues and responding quickly for our customers," she said.

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