2009

Corvette ZR-1

Corvette presenteert zijn snelste en krachtigste model ooit: de ZR1.
Onder de motorkap ligt een nieuwe V8 met een vermogen van 620 pk.
Passend bij het indrukwekkende potentieel van de auto heeft de ZR1 diverse carbon elementen om het gewicht te verminderen, aangepaste remmen en een specifieke uitrusting waaronder schitterende 19 inch wielen.

Om u al wat meer te kunnen informeren hebben wij de nodige informatie omtrent dit fenomeen verzameld.
Vanuit Amerika hebben we de nodige teksten bekomen, deze zijn echter wel Engelstalig.

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DETROIT – In 1990, the Corvette ZR-1 caused a stir with its wider quarter panels, convex rear fascia and squared tail lamps. They were the visual clues that identified the special car – the shark fins that made the ZR-1 stand out in a sea of feeders.

Spotting the '09 ZR1 at a glance is a snap, too, with its unique, carbon-fibre dual-port fenders, exposed carbon-fibre roof panel, rockers and front splitter, as well as a unique rear spoiler. Also exclusive to the ZR1 is a raised, carbon-fibre hood with a polycarbonate window that provides a view of the supercharged engine's intercooler that proclaims "LS9 SUPERCHARGED."

Enthusiasts may consider the ZR1's hood a crystal-clear glimpse at the soul of the ultimate Corvette, while owners of slower, more expensive exotics might just look through it with a green tinge of envy.

"There is nothing subtle about the ZR1," said Kirk Bennion, exterior design manager. "It is a car that isn't shy about its capability."

"The king has returned," said Ed Peper, Chevrolet general manager. "The new ZR1 upends the notion of what an American supercar can deliver, with performance that trumps exotics that cost two, three or four times as much – and does so with the driving ease of a daily commuter."

1. Design Details

While the exposed carbon fibre elements and windowed hood symbolize the car's character, there are numerous other design details that are less obvious yet no less important to the ZR1's performance. They include:

- Carbon-fibre front fenders widened to accommodate the ZR1's larger front wheels and tires
- ZR1-specific twin vents in the front fenders
- Full-width rear spoiler with raised outboard sections incorporates the centre high-mounted stop lamp
- ZR1-specific 20-spoke alloy wheels in Sterling Silver (chrome available)
- Nineteen-inch front wheels and 20-inch rear wheels inspired by C6R race cars
- Michelin Pilot Sport 2 tires; P285/30ZR19 in front and P335/25ZR20 in the rear
- ZR1-specifc blue-painted brake rotors visible through the wheels

"The ZR1 has a performance-driven design," said Bennion. "There is an aesthetic element to all of the unique features, but they were developed first and foremost to support the car's performance capability."

Bennion cites the front splitter and rear spoiler as prime examples.

"Because of its top-speed and handling capabilities, the ZR1 requires more down force than the Z06 and the splitter and rear spoiler were carefully shaped and wind-tunnel tested to meet that requirement," he said. "The front fenders were widened to cover the wider wheels and their new, twin-outlet vents provide a path for hot air to escape."

The ZR1 shares the front fascia with the Z06, but the brake-cooling ducts are revised to channel more air to the brakes. Even the front suspension's A-arms were aerodynamically optimized – they feature air deflectors that direct air to the carbon-ceramic brake rotors.

The ZR1 is available in seven exterior colours, including: Black, Velocity Yellow Tint coat, Victory Red, Atomic Orange Metallic, Jetstream Blue Metallic Tint coat and two new colours – Blade Silver Metallic and Cyber Gray Metallic.

2. Exposed carbon-fibre

A lightweight material pioneered in racing circles, carbon-fibre has an undeniable air of exoticness and only a few production cars have ever employed the relatively expensive composite in their exterior panels. The 2004 Corvette Z06 Commemorative Edition featured a carbon-fibre outer hood and the current Z06 has carbon-fibre fenders and floor panels.

On the ZR1, the roof panel, roof bow, lower rocker mouldings, front splitter and the underside of the hood feature exposed-weave carbon-fibre. The other carbon-fibre parts of the ZR1 include the front fenders and hood. The front fascia, doors, rear fenders and rear fascia are made of various other composite materials and all are painted body-colour.

The carbon-fibre panels contribute to the car's visual identity – particularly the exposed-weave panels – but they also serve an important purpose: they save weight. The carbon-fibre roof panel and roof bow, for example, weigh about 7.7 pounds (3.5 kg) less than the already lightweight composite panels on the Corvette Z06.
Ironically, the identifiable and intricate weave pattern of carbon-fibre on most production cars is hidden beneath a shell of paint, because the weave is very susceptible to ultra-violet (UV) light damage, which can cause yellowing or a generally dull appearance. But thanks to a specially developed material that ensures a deep, lustrous and long-lasting finish, the '09 ZR1's exposed-weave panels feature a clear coat that protects like paint.
"The clear coat is applied to the exposed carbon-fibre panels that are exposed to sunlight," said Mark Voss, designing engineer. "In addition to preventing damaging UV rays, the coating has the chip and scratch resistance of conventional paint."

The special clear coat, which is a proprietary product developed by a GM supplier for the ZR1 program, gives the carbon-fibre parts a shiny, almost wet finish that adds to the visual depth of the weave pattern.

3. Interior details

The ZR1's interior builds on the brand's dual-cockpit heritage, with high-quality materials, craftsmanship and functionality that support the premium-quality experience promised by the car's performance. The ZR1's cabin differs from the Corvette and Corvette Z06 with the following:

- ZR1-logo sill plates
- ZR1-logo headrest embroidery
- Specific gauge cluster with "ZR1" logo on the tachometer and a 220-mph (370 km/h) readout on the speedometer
- Boost gauge added to the instrument cluster and Head-Up Display

The "base" ZR1 (RPO 1LZ) comes with accoutrements based on the Z06, including lightweight seats and lightweight content. The up-level interior package includes unique, power-adjustable and leather-trimmed sport seats (embroidered with the ZR1 logo); custom, leather-wrapped interior available in four colours; navigation system, Bluetooth connectivity and more.

4. Basic stats

Dispensing with the formalities and getting right down to business, here are the ZR1's basic stats:

- All-new LS9 supercharged 6.2L V-8 targeted at producing at least 100 horsepower per litre, or 620 horsepower (462 kW), and approximately 595 lb.-ft. of torque (823 Nm)
- Six-speed, close-ratio, race-hardened manual transmission
- New, high-capacity dual-disc clutch
- Higher-capacity and specific-diameter axle half-shafts; enhanced torque tube
- Specific suspension tuning provides more than 1g cornering grip
- Twenty-spoke 19-inch front and 20-inch rear wheels
- Michelin Pilot Sport 2 tires – P285/30ZR19 in front and P335/25ZR20 in the rear – developed specifically for the ZR1
- Standard carbon-ceramic, drilled disc brake rotors – 15.5-inch-diameter (394-mm) in the front and 15-inch-diameter (380-mm) in the rear
- Larger brake callipers with substantially increased pad area
- Standard Magnetic Selective Ride Control with track-level suspension
- Wider, carbon-fibre front fenders with ZR1-specifc dual vents
- Carbon-fibre hood with a raised, polycarbonate window – offering a view of the intercooler below it
- Carbon fibre roof panel, roof bow, front fascia splitter and rocker mouldings with clear-coated, exposed carbon-fibre weave
- ZR1-specific full-width rear spoiler with raised outboard sections
- Specific gauge cluster with boost gauge (also displayed on the Head-Up Display) and 220-mph (370 km/h) speedometer readout
- Only two options: chrome wheels and a "luxury" package
- Curb weight of approximately 3,350 pounds (1,519 kg)

The specialized components of the new ZR1 work harmoniously to deliver the most powerful and fastest automobile ever produced by General Motors. Performance estimates will be announced closer to vehicle's summer 2008 launch.

"Preliminary testing shows the ZR1 bests the highly respected Corvette Z06 in every performance category, from acceleration and braking, to cornering grip and top speed," said Peper. "It all boils down to the power-to-weight ratio and the ZR1's is exceptional – better than the Porsche 911 GT2, the Ferrari 599 and even the Lamborghini LP640. In fact, the ZR1 is expected to be the first production Corvette to achieve a top speed of at least 200 mph."

5. Supercharged LS9 engine

The new LS9 6.2L small-block engine is the phenomenal power plant the supports the ZR1's performance capability. The enabler of the LS9's phenomenal performance and refinement is a large, positive-displacement Roots-type supercharger with a new, four-lobe rotor design. It is augmented with an integrated charge cooling system that reduces inlet air temperature for maximum performance.

A sixth-generation supercharger developed by Eaton helps the LS9 make big power and torque at lower rpm and carries it in a wide arc to 6,600 rpm, as it pushes enough air to help the engine maintain power through the upper levels of the rpm band – the area where supercharged performance tends to diminish. Heavy-duty and lightweight reciprocating components enable the engine's confident high-rpm performance.

The LS9 is hand-assembled at GM's Performance Build Centre and incorporates specialty processes typically seen in racing engines to produce a highly refined and precise product. For example, cast iron cylinder liners are inserted in the aluminium block and are finish-bored and honed with a deck plate installed. The deck plate simulates the pressure and minute dimensional variances applied to the block when the cylinder heads are installed, ensuring a higher degree of accuracy that promotes maximum cylinder head sealing, piston ring fit and overall engine performance.

6. Transmission and axle

The LS9 engine is backed by a new, stronger six-speed manual transmission and a twin-disc clutch that provides exceptional clamping power, while maintaining an easy clutch effort. ZR1-specific gearing in the transmission provides a steep first-gear ratio that helps launch the car and top speed is achieved in sixth gear – a change from the fifth-gear top-speed run-outs in the manual-transmission Corvette and Corvette Z06.

As the term implies, the twin-disc clutch system employs a pair of discs, which spreads out the engine's torque load over a wider area. This enables tremendous clamping power when the clutch is engaged. It also dissipates heat better and extends the clutch life (in normal driving).

The twin-disc clutch system also contributes to the ZR1's exceptional driving quality, with smooth and easy shifting. The twin-disc system's design enables a 25-percent reduction in inertia, thanks to smaller, 260-mm plates, corresponding to a pedal effort that is similar to the Corvette Z06's 290-mm single-disc system.

The rear axle also is stronger in the ZR1 and features asymmetrical axle-shaft diameters that were developed after careful testing to provide optimal torque management. The axles are also mounted on a more horizontal plane that correlates with the wider width of the rear wheels and tires.

7. Suspension tuning and Magnetic Selective Ride Control

The ZR1 retains the 105.7-inch (2,686-mm) wheelbase of other Corvette models, as well as the short-long arm suspension and transverse spring design, but it rides on all-new, wider wheels and tires, stops with carbon-ceramic brakes and features specific spring and stabilizer bar rates – the largest-diameter stabilizer bars available on a Corvette. Also, the axle half-shafts are angled more horizontally to align with the different geometry created by the ZR1's larger-diameter and wider rear wheels.

Magnetic Selective Ride Control (MSRC) is standard and tuned specifically for the ZR1. It is a real-time damping system that replaces conventional mechanical-valve shocks with electronically controlled shocks filled with a synthetic fluid containing minute iron particles. Under the presence of magnetic charge, the iron particles align to provide damping resistance almost instantly.

MSRC "reads" the road in 1-milisecond intervals (a thousand times per second), making it the world's fastest-reacting damping system. Its ability to deliver a compliant ride with nearly instantaneous damping adjustments enabled engineers to develop a surprisingly supple ride quality in a supercar that still delivers cornering grip of more than 1g.

"The damping control of MSRC allowed for front and rear springs that have a slightly lower rate than the Z06, which enhances the car's ride quality," said Juechter.

From a high-performance perspective, Magnetic Selective Ride Control helps the rear axle remain planted during launch for smooth, hop-free acceleration. It also helps suppress axle movement when cornering on broken or uneven pavement.

With cornering capability greater than the Z06, the ZR1's power train was upgraded with a higher-capacity oil pump and larger-capacity oil reservoir. This ensures optimal oil pressure during the highest-load driving manoeuvres.

8. Ride and handling

The ZR1 is built on the same aluminium-intensive chassis as the Corvette Z06 and features similar independent SLA front and rear suspensions, with aluminium upper and lower control arms. Where the ZR1 differs is the suspension tuning, which was optimized for the car's steamroller-wide front and rear tires.

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Yet for all its astounding performance attributes, the 2009 Corvette ZR1 has a refined driving experience that makes it a daily-driveable supercar.

“The ZR1 is a car anyone can drive confidently and comfortably,” said Tom Wallace, vehicle line executive. “From the very beginning, refinement, balance and compliance were targets that were as important as the car’s maximum performance.”

More than simply scaling wheel, tire and brake sizes to match the power train’s output, the ZR1’s engineers harmonized the chassis and suspension components to deliver a ride quality and driving experience that is unmatched by most supercar competitors. Enabling elements include standard Magnetic Selective Ride Control and new, Michelin Pilot Sport 2 tires that were developed specifically for the car.

“The ZR1 corners better than the Z06, but has ride compliance more like the base coupe,” said Tadge Juechter, Corvette chief engineer. “Every element from the stabilizer-bar diameters to the composition of the tires was carefully matched to deliver a balanced driving experience – it’s a supercar that doesn’t sacrifice ride quality for performance.”

Stopping power is derived from a carbon-ceramic-based brake system that is lightweight, heat resistant and wear resistant. While delivering braking performance similar to a race car, it helps reduce the unsprung mass that the ZR1 would have accrued through the use of similarly sized cast iron brake rotors.

“It wasn’t enough to achieve the braking requirements commensurate with the car’s performance – we needed to find a solution that minimized the impact on the car’s balanced feel,” said Juechter. “A larger brake package generally means more weight, but the carbon-ceramic rotors deliver excellent performance while also minimizing unsprung weight.”

9. Lightweight structure

The ZR1 has an aluminium structure for optimum stiffness and low mass. It is the same structure used on the Z06, but with specific body panels and drive train components mounted to it.

The chassis is constructed with perimeter rails made of strong, single-piece hydroformed aluminium members featuring cast suspension nodes. Other castings, stampings and extrusions are combined into the structure with state-of-the-art manufacturing technologies. Advanced structural composites featuring carbon-fibre are bonded to the aluminium structure. The passenger compartment floors, for example, combine carbon-fibre skins with an ultra-lightweight balsa wood core.

Like the Z06, the ZR1 has a magnesium cradle that serves as the attachment point for the engine and some front suspension components, with the new LS9 engine sitting slightly lower in the chassis than the Z06's LS7 engine. Magnesium is lighter than aluminium yet incredibly strong. The magnesium cradle helps improve the front-to-rear weight distribution, as do the carbon-fibre front fenders, hood and wheelhouses.

10. Carbon-ceramic brakes

The ZR1 comes standard with carbon-ceramic brake rotors and large-capacity callipers at all for corners. The exotic carbon-ceramic rotors are made of a carbon-fibre-reinforced ceramic silicon carbide material, which offers low mass and exceptional resistance to wear and heat.

The vented and cross-drilled rotors on the ZR1 measure 15.5 inches (394 mm) in diameter in the front and 15 inches (380 mm) in diameter in the rear – making them among the largest carbon-ceramic rotors available on any production vehicle. And while large in size, they are low in mass, saving approximately 11 pounds (5 kg) per corner over comparably sized cast iron rotors.

The rotors are acted upon by six-piston front callipers and four-piston rear callipers, each painted a ZR1-exclusive blue. The front pads are equivalent in size to the largest on any production car with a single-pad design, measuring 148 sq. cm. in surface area – double that of the Corvette Z06's 70-sq.-cm. front pads.

Braking performance of the ZR1 is nothing short of phenomenal, with the carbon-ceramic rotors and large callipers combining to provide exceptionally short, fade-free stopping during high-performance driving. The composition and durability of the non-metallic carbon-ceramic materials means the rotors should never show any corrosion or require replacement for the life of the vehicle, when used in normal driving.

A new, Bosch brake-apply system is standard and includes the brake master cylinder, booster and ABS control module. It is tuned specifically for the ZR1 and is not shared with other Corvette models. The system works with Magnetic Selective Ride Control to deliver a very competent and intuitive active handling system – complete with a Competitive Driving mode.

11. Michelin Pilot Sport 2 tires

The ZR1 rides on Michelin Pilot Sport 2 (PS2) tires, measuring P285/30ZR19 in front and P335/25ZR20 in the rear. And while the PS2 tire is familiar with enthusiasts, those on the ZR1 were engineered specifically for the car.

"We didn't merely specify a set of off-the-shelf PS2s for the ZR1," said Juechter. "Michelin's engineers worked with GM to develop tires for the car that took into account factors such as the ZR1's performance goals, expected horsepower, curb weight, weight distribution, aerodynamic down force, top speed and more. The construction of these tires is unique to the ZR1."

To maximize weight savings, there is no spare tire in the ZR1; the PS2 tires feature Michelin's ZP technology and can be driven for a short distance with zero pressure until servicing can be attained.

12. Racing-inspired wheels

The ZR1 rides on exclusive 20-spoke alloy rims that measure 19 inches by 10 inches in the front and 20 inches by 12 inches in the rear, making them the largest ever offered on a Corvette. Their design was inspired by the multi-spoke racing wheels used on Corvette C6R race cars, which enhance the strength of the wheel at the rim. A bright, Sterling Silver paint finish is standard and a chrome version is optional.

The wheels, while slightly larger in mass than the smaller wheels of the Z06, were developed to be as lightweight as possible, minimizing the ZR1's unsprung mass.

14. Corvette ZR1 2009- Preliminary Specifications

Overview	
Model:	2009 Chevrolet Corvette ZR1
Body styles / driveline:	2-door hatchback coupe with fixed roof; rear-wheel drive
Construction:	composite and carbon-fibre body panels, hydroformed aluminium frame with aluminium and magnesium structural and chassis components
Manufacturing location:	Bowling Green, Ky.

Engine	**6.2L SUPERCHARGED V-8 (LS9)**
Displacement (cu in / cc):	376 / 6162
Bore & stroke (in / mm):	4.06 x 3.62 / 103.25 x 92
Block material:	cast aluminium
Cylinder head material:	cast aluminium
Valvetrain:	overhead valve, 2 valves per cylinder
Fuel delivery:	SFI (sequential fuel injection)
Compression ratio:	9.1:1
Horsepower / kW:	620 / 462 (est.)
Torque (lb-ft / Nm):	595 / 823 (est.)
Recommended fuel:	premium required
EPA estimated fuel economy:	TBD
Brakes	
Type:	front and rear power-assisted carbon-ceramic disc with 6-piston front and 4-piston rear callipers, cross-drilled rotors; ABS std.
Rotor diameter (in / mm):	front: 15.5 / 394 rear: 15 / 380

Transmission	close-ratio six-speed manual
Application:	std
Gear ratios (:1):	
First:	2.29
Second:	1.61
Third:	1.21
Fourth:	1.00
Fifth:	0.81
Sixth:	0.67
Reverse:	3.11
Final drive ratio:	3.42

Chassis / Suspension	
Front:	short/long arm (SLA) double wishbone, cast aluminium upper & lower control arms, transverse-mounted composite leaf spring, monotube shock absorber
Rear:	short/long arm (SLA) double wishbone, cast aluminium upper & lower control arms, transverse-mounted composite leaf spring, monotube shock absorber
Traction control:	electronic traction control; active handling (Magnetic Selective Ride Control)
Wheels & Tires	
Wheel size:	front: 19-inch x 10-inch rear: 20-inch x 12-inch
Tires:	Michelin Pilot Sport 2 front: P285/30ZR19 rear: P335/25ZR20
Dimensions	
Wheelbase (in / mm):	105.7 / 2685
Overall length (in / mm):	176.2 / 4476
Overall width (in / mm):	75.9 / 1928
Overall height (in / mm):	49 / 1244
Curb weight (lb / kg):	3350 / 1519 (est.)
Cargo volume (cu ft / L):	22 / 634
Fuel tank (gal / L):	18 / 68.1
Engine oil (qt / L):	12.5 / 11.8
Interior	
Seating capacity	2
Interior volume (cu ft / L):	52 / 1475 (all models)
Headroom (in / mm):	38 / 962 (all models)
Legroom (in / mm):	43 / 1092 (all models)
Shoulder room (in / mm):	55 / 1397 (all models)
Hip room (in / mm):	54 / 1371 (all models)

Note: Information shown is current at time of publication. Please visit our GM Media web site at http://media.gm.com for updates.

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