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2013 Fiat 500e: Engineering

- World-class handling for an electric vehicle (EV), thanks to the all-new 2013 Fiat 500e's unique chassis hardware and specific suspension tuning
- World-class braking provided by larger vented front-disc brakes and a high efficiency energy-regenerating system. Heat energy typically lost during braking is instead converted to electricity to recharge the battery
- Strategically located battery pack improves this electrified Cinquecento's front-to-rear balance
- Fiat 500e features a quieter interior thanks to 12 product-specific improvements to reduce noise in the cabin while driving
- Redesigned body structure delivers a 10 percent improvement in bending stiffness, while accommodating the powerful 97-cell lithium-ion battery pack

November 27, 2012, Los Angeles - Rather than compromising the essence of a fun-to-drive icon, the all-new 2013 Fiat 500e was engineered to deliver world-class electric vehicle (EV) handling and braking performance, while further solidifying the engaging European driving dynamics the FIAT brand and Cinquecento are known for.

Upgraded chassis with an emphasis on handling
The all-new 2013 Fiat 500e features a specially engineered suspension tailored for its EV architecture and capable of highly engaging dynamics in an electric vehicle.

The suspension of the Fiat 500e is re-engineered with new increased spring rates and unique front-strut and rear-shock tuning, for optimum ride comfort and body control, fully retaining the fun-to-drive character that the Fiat 500 is already known for. In addition, Fiat 500e's 15 x 5.5-inch (front) and 15 x 6.5-inch (rear) aluminum wheels add stability at high speeds.

The 2013 Fiat 500e features a 16.3:1 steering-gear ratio to enhance responsiveness, maneuverability and performance feel. In addition, this electrified Cinquecento features a uniquely tuned electronic power steering (EPS) calibration for increased steering response and feedback. In addition, the Fiat 500e's EPS system is designed to compensate for temporary road crown and crosswind situations where there is a constant push of the car to one side or another, assisting the driver to not have to drive against such a condition.

Energy-regenerating disc brakes
The all-new Fiat 500e features 2.1-inch (54 mm) diameter single-piston front-brake calipers with larger 11.1-inch (284 mm) (up from 10.1-inch; 257 mm) diameter ventilated rotors for additional braking surface and heat dissipation. The 9.4-inch (240 mm) rear disc-brake system also features single-piston brake calipers.

Taking advantage whenever the driver slows, the Fiat 500e's regenerative braking system converts kinetic energy to electricity, while helping to provide additional range by charging the lithium-ion battery. In addition, the Fiat 500e provides the driver with the traditional "connected" feel of an internal combustion vehicle when coasting. Tying it altogether is the Fiat 500e's regenerative braking controller (RBC) that receives the driver's brake-pedal input and determines the total amount of brake power requested. Depending on input levels, the RBC is able to adjust the level of friction and regenerative braking instantly.

The Fiat 500e features a four-channel electronic stability control (ESC) system that monitors the speed of each wheel individually. The four-channel system allows individual wheel braking for superior control and provides backup braking in the unlikely event that one of the two braking circuits would fail. The anti-lock brake (ABS) software uses a steering wheel angle sensor that allows the system to differentiate between straight-line braking and braking in a turn,

resulting in better straight-line braking with minimal yaw.

ESC helps maximize driver control in all conditions by combining both engine torque and brake control to regulate wheel spin at all driving speeds. When the system senses impending wheel slip during acceleration, it signals the throttle control to reduce drive wheel torque. Under extreme situations, such as going from pavement to ice during acceleration, the system will selectively apply the brakes to maintain control. An ESC button on the center stack allows the driver to partially turn off the system.

Other features in the Fiat 500e's ESC system include:

- Electronic brake-force distribution (EBD)
- Electronic rollover mitigation (ERM)
- Hill-start Assist (HSA)
- Brake Assist

Fiat 500e provides a quieter interior

With 2013 Fiat 500e's electric powertrain, and redesigned body structure, engineers took the opportunity to develop an all-new noise, vibration and harshness (NVH) package to improve interior quietness.

In addition to the reduction in wind noise gained through the Fiat 500e's eight exterior aero dynamic improvements, this electrified Cinquecento includes 12 product-specific improvements aiding in the vehicle's reduction in interior cabin noise while driving. These NVH improvements include:

- Additional mastic patches on floor
- Additional sound-deadening material in rear quarter body cavity
- Additional acoustic pads to wheelhouse liners
- New gasket between the mirror flag and door
- New mirror flag and B-pillar applique foam seals
- Additional 8 mm acoustic pad to rear floor behind rear seats
- New antenna with strakes
- New carpet mass layer
- New noise absorption pads in front doors
- New isolated engine torque mount
- Improved door glass belt and channel sealing
- New acoustic windshield glass
- Redesigned body structure adds rigidity and improved weight distribution

A new lower-body structure design provides packaging and protection for the 2013 Fiat 500e's battery, while delivering a 10 percent improvement in bending stiffness.

With extensive use of advanced steels, composites and advanced computer-impact simulations, the Fiat 500e's redesigned architecture delivers world-class torsional stiffness for optimum control of body geometry, while accommodating its powerful 97-cell lithium ion battery. Engineers ensured that the revised underbody's design was minimally intrusive to interior space, while providing a tighter and stiffer feel, with an added sense of confidence and control during higher speed maneuvers.

In addition, the design change from internal combustion to battery-electric enabled the Fiat 500e to repackage its weight for a 57/43 (compared to Fiat 500's 64/36) front-to-rear weight distribution to improve handling performance.

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