



ROAD TOUR
2024

- SPECIAL EDITION -



PIERCE®
VOLTERRA™
ELECTRIC VEHICLES

PIERCE® VOLTERRA™ PUMPER FAQs



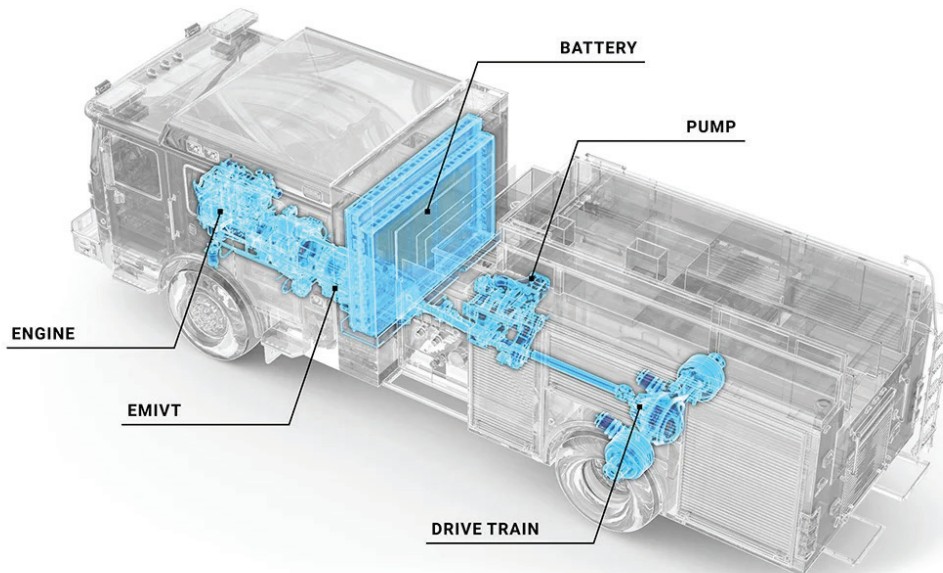
WHAT ARE THE THREE MOST COMMON QUESTIONS ASKED ABOUT THE PIERCE® VOLTERRA™ ELECTRIC PUMPER?

1. How long does the battery last?
2. How long can you operate (pump) on the battery?
3. How long does it take to fully charge?

The answer to all of these three most commonly-asked questions is, “It depends.” It depends on charging infrastructure, charger size, how many calls the truck goes on in a day, the average distance traveled to scenes, and much more.

Customers can work with their dealer to use the Pierce Volterra Impact of Ownership Estimator to analyze a personalized estimate of battery use and charging time. Longevity of the battery depends on department use of the truck.

The batteries on the Pierce Volterra truck are designed to power all truck operations as long as the battery level is running above the lowest threshold. Once below the threshold, the internal combustion engine (ICE) automatically kicks in and maintains the rated power to the vehicle.



WHAT TYPE OF CHARGING INFRASTRUCTURE IS REQUIRED, AND WHAT IS THE COST?



Pierce recommends a DC Fast Charger that has the option of a depot box-type dispenser. This will support suspending the charging cable from the ceiling in the bay and will be less intrusive than other options.

Analysis of call volume, average call times, typical driving distances, and standby time will help determine charging solutions that best fit department needs. Departments can work with their electrical contractors to ensure they get the charging structure that is best suited for them.

The cost for charging solutions depends on several factors, including the charging structure requested, the electrical contractor, and the equipment chosen.

WHAT TYPE OF BATTERY IS USED?

The Pierce Volterra Platform of Electric Vehicles uses a Lithium Ion battery. It has industry-leading energy density, a flexible design, and ruggedized commercial-grade housing which is safe, reliable, and efficient.



WHERE IS THE CHARGING PORT ON THE TRUCK LOCATED?



The Combined Charging System (CCS) charging inlet is located behind an access door on the left side (driver's side) of the battery rack (just behind the cab). The CCS inlet allows either a Level 2 AC charging or a DC fast charging connection to charge the high voltage batteries.

DOES THE CHARGER NEED TO BE UNPLUGGED BEFORE STARTING/DRIVING THE VEHICLE?

Yes. There are interlocks in place to ensure the vehicle will not start if a charge plug is connected to the charge port. This follows EV industry standards outlined by the Society of Automotive Engineers (SAE).



HOW IS BATTERY STATE, LIFE, CYCLES, AND CONDITION MONITORED?



The battery system contains an integrated Battery Management System (BMS) that monitors temperature, voltage, current, State of Charge (SOC), and more. The BMS maintains battery cell balance and provides the vehicle with current limitations to maximize life and performance.

IS THERE ADDITIONAL DIAGNOSTIC SOFTWARE NEEDED?

No. Diagnostics are provided through the Command Zone™ display. Along with monitoring the EV diagnostics, Command Zone helps operators monitor:

- **Vehicle Speed**
- **Seat Belt Monitoring**
- **Tire Pressure Monitoring**
- **Pump Operation Data**
- **Alert for Door(s) Not Closed, Component(s) Not Stowed, and Interlocks Not Met**
- **Vehicle Faults, Warnings, and Cautions**

WHEN DOES THE APPARATUS SHIFT FROM EV TO ICE?

The vehicle automatically transitions from Electric Vehicle (EV) to Internal Combustion Engine (ICE) mode when SOC becomes low. The percentage of charge that triggers the transition depends on vehicle use:

- **Driving: The vehicle will transition at 0% SOC**
- **Pump Mode: 15% SOC is reserved to facilitate a return drive to the fire station on EV**



There is also an EV button on the shift selector that allows the operator to transition between EV and ICE at anytime.

CAN THE CONDITIONS FOR THE AUTOMATIC SHIFT FROM EV TO ICE BE ADJUSTED AT ANY TIME?

No. The Pierce Volterra apparatus is designed to maximize performance, available energy, and life of the vehicle. The conditions for automatic shift from EV to ICE (at 15% SOC in pump mode and 0% SOC while driving) is standard on all Pierce Volterra apparatus. The operator can press the EV button on the shift selector if they would like to transition from EV to ICE or from ICE to EV.



WHAT IS RECOMMENDED FOR OPERATOR TRAINING?

Training is similar in scope to conventional apparatus training because the Pierce Volterra apparatus operates like a traditional fire truck. The only additional training involves how to charge the vehicle, start the vehicle in ICE mode, and manually switch the vehicle from EV to ICE.

IS THERE A WARRANTY, AND WHAT DOES IT COST TO REPLACE THE BATTERY PACK?

There is a 6-year warranty on the battery pack, with an option for a 12-year warranty. Departments can elect which warranty will best suit their department.

It is difficult to project battery pack replacement costs into the future due to the newness to the market. The industry expects that, like most new technology, the cost will come down over time. We can use TVs as an example: Flat screen TVs were quite expensive when they first appeared on the market. Since that time the cost for that technology has come down, and flat screens are now very affordable for everyone.

CAN THIS VEHICLE CHARGE AT A STANDARD PUBLIC CHARGING STATION?

Yes. The Pierce Volterra apparatus can charge at a standard public charging station designed to the CCS1 standard. For optimal charging, however, it is recommended that the vehicle be charged at the station with the charging system that was designed for the truck.

IS THE PIERCE VOLTERRA APPARATUS A HYBRID?

No. The Pierce Volterra apparatus is not a hybrid because the diesel engine does NOT charge the batteries. The vehicle uses each component (EV or ICE) independently: the vehicle runs on either electric power OR the diesel engine. The only way to charge the battery is to plug it into a power source and charge from the grid, which Pierce believes is the cleanest, most efficient way to charge an electric vehicle.

*Hybrid vehicles have batteries that are continuously charged by the internal combustion engine as the vehicle operates.

WHAT INTERNAL COMBUSTION ENGINE IS USED IN THE PIERCE VOLTERRA PUMPER? ARE THERE OPTIONS FOR OTHER ENGINES?

The Cummins ISB 6.7-liter 350-horsepower (hp) diesel engine is the only internal combustion engine available. Experts believe this engine provides the maximum power and performance needed for the Pierce Volterra apparatus.

WHAT IS REGENERATIVE BRAKING IN EV? HOW DOES IT WORK?

The Pierce Volterra apparatus uses regenerative braking, a feature found in many types of EVs. Regenerative braking enables the vehicle to capture unused energy during deceleration, when the accelerator pedal is released by the operator. Upon the release of the accelerator, the braking is smoothly controlled with the accelerator rather than with a typical engine brake.

Regenerative braking recaptures unused energy and puts it back into the system, replenishing the battery a little bit each time the accelerator pedal is released. These small energy captures can accumulate to improve the battery range over time. Operators will quickly gain a feel for regenerative braking. Low/High switches on the dash in the cab of a Pierce Volterra apparatus enable the operator to select the desired amount of regenerative braking.

CAN YOU EXPLAIN THE POWERTRAIN OF PIERCE VOLTERRA PLATFORM OF ELECTRIC VEHICLES?

The Pierce Volterra Platform of Electric Vehicles is powered by the Oshkosh-patented Electro-Mechanical Infinitely Variable Transmission (EMIVT). The EMIVT replaces the Allison transmission and is the foundation required whether running on battery or internal combustion engine (ICE).

The EMIVT powers the drivetrain in both applications. The Pierce Volterra apparatus is the only EV fire truck currently available that is NOT a hybrid due to use of a parallel-electric drivetrain. The parallel-electric drivetrain enables the Pierce Volterra apparatus to provide continuous, uninterrupted driving capability for ongoing emergency response. With the engine coupled directly to the drivetrain, the apparatus is automatically and seamlessly able to switch from all-electric to all-engine mode to continuously support all truck operations (including up to 2,000 gpm pump) during extended duration emergency events.

WHAT IS THE ACCELERATION PERFORMANCE AND TOP SPEED?

The acceleration performance of the Pierce Volterra apparatus is similar to a fire apparatus that use the Cummins L9 diesel engine for its power source.

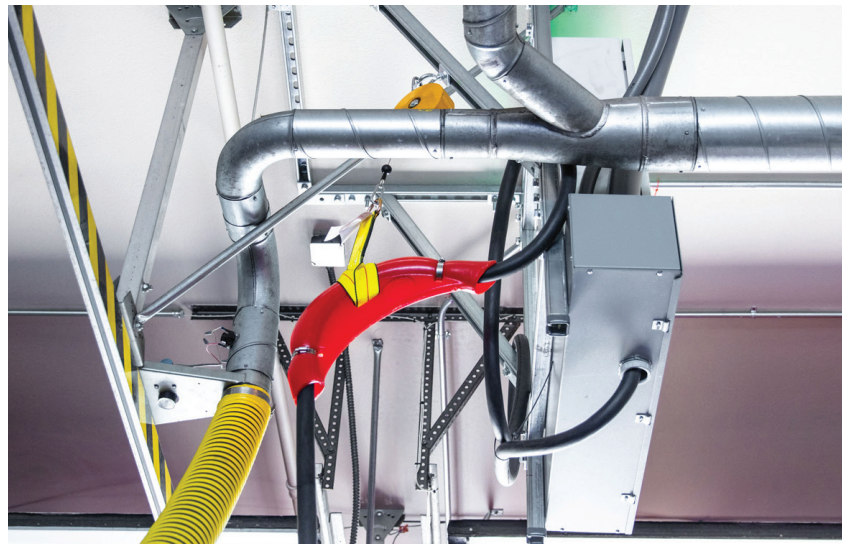
WHAT MAINTENANCE REQUIREMENTS ARE THERE FOR EV COMPONENTS?

A few of the common maintenance requirements for Pierce Volterra apparatus are:

- **EMIVT oil and filter replacement (Annual)**
- **High-Voltage (HV) Battery Dessicant Replacement (Annual)**
- **Engine Clutch Lubrication (Bi-Annual)**
- **HV System Coolant Replacement (2,000 Hours or 24 Months)**
- **Transmission Accessory Drive Serpentine Belt**

Common ICE maintenance requirements are also required:

- **Periodic Diesel Exhaust Fluid (DEF) Replacement (if equipped)**
- **Periodic running of ICE to maintain readiness**





WHAT IS THE AVERAGE MAINTENANCE COST AS COMPARED TO A DIESEL-POWERED UNIT?

Maintenance for a Pierce Volterra apparatus is very similar to a traditional diesel-powered apparatus. Customers should keep in mind that, while there may be a few additional maintenance tasks with the EV battery and components, there may be a reduction in traditional maintenance tasks such as:

- **Less routine engine maintenance (oil, air filter)**
- **Less engine regeneration**
- **Less fuel consumption**
- **Less DEF consumption**
- **Fewer brake system replacements**

Additional Resources:

[Pierce® Volterra™ Platform of Electric Vehicles Website](#)

[Electric Fire Truck Reference Guide](#)

[Pierce® Volterra™ Platform of Electric Vehicles: The Story Behind the Technology](#)

[A Day in the Life of a Volterra Electric Fire Truck](#)

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