

# SAE J-3105™ Heavy-Duty Conductive Automatic Charging Recommended Practice

February 10, 2020

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# Together...Shaping the Future of Electricity

# Automated Connectors



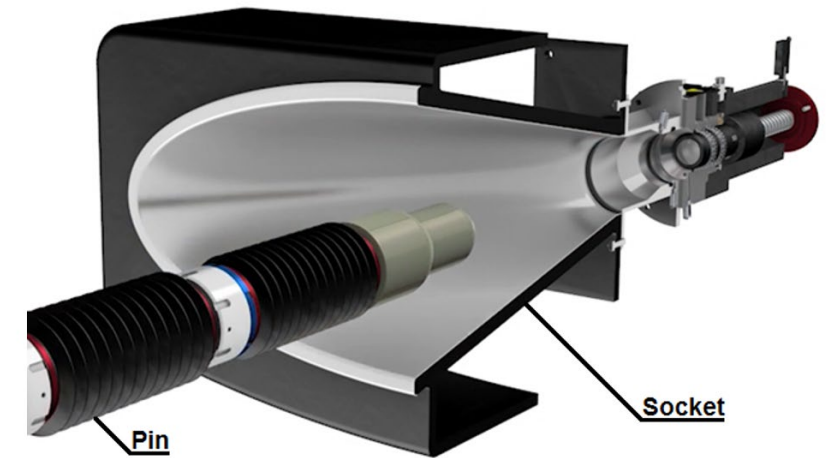
**SAE J-3105-1**

**Infrastructure-mounted Cross  
Rail Connection**



**SAE J-3105-2**

**Vehicle-mounted Pantograph  
Connection**

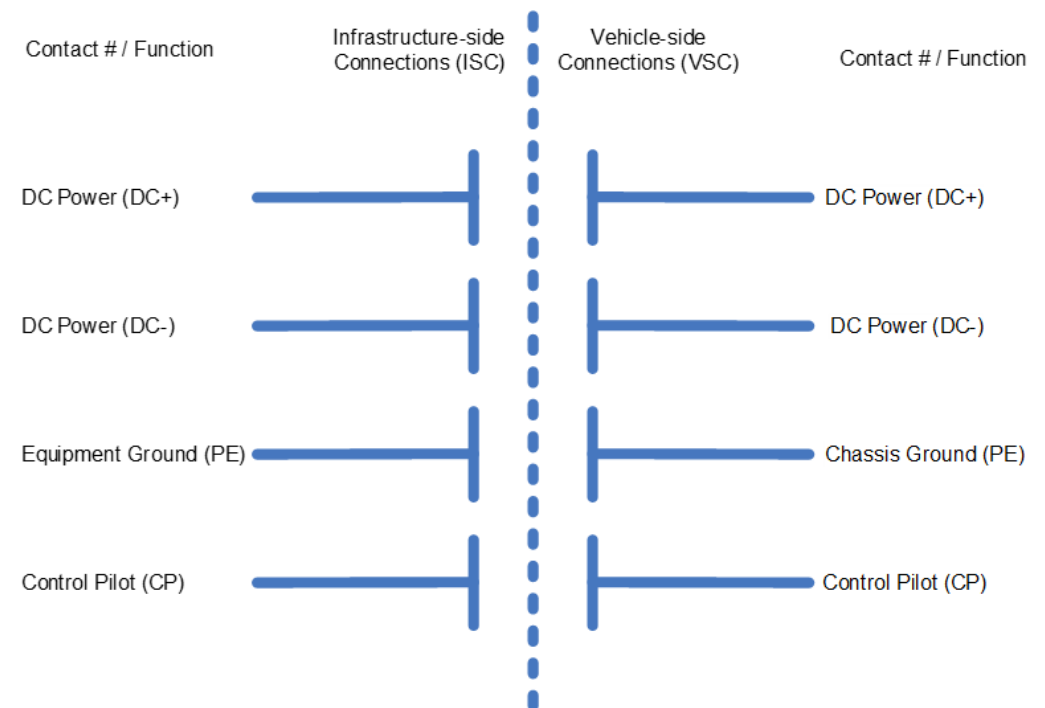
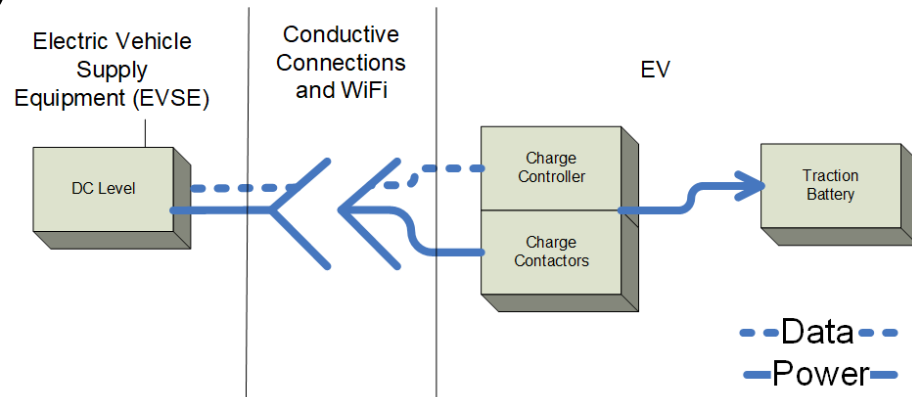


**SAE J-3105-3**

**Enclosed Pin and Socket  
Connection**

# Automated Connectors SAE J-3105 Recommended Practice

- The Recommended Practice will be produced as a family of documents connected together by a main document.
- The main document J-3105 will contain the significant common parts of the system (about 90%). It will include:
  - Electrical Interface
  - Power Flow (Voltage and Currents)
  - Communications
  - Safety
  - Systems





# J-3105 Recommended Practice

## SAE STANDARDS NEWS

### SAE publishes On-Route Mechanized Conductive EV Charging Systems Recommended Practices

SAE International published SAE J-3105 Electric Vehicle Power Transfer System Using Conductive Automated Connection Devices Recommended Practice in January 2020. The document promotes the safe testing and performance of mechanized conductive power transfer systems. Written for buses and heavy-duty vehicles in general, SAE J-3105 encompasses the general physical, electrical, functional, testing and performance requirements for conductive power transfer primarily for vehicles using a conductive automated-charging-device (ACD) connection capable of transferring DC power.

As the EV market expands, the need for the continued standardization of DC power distribution remains, and SAE J-3105 addresses three interfaces required to ensure power delivery is consistent. It defines a conductive power transfer method including the curbside electrical contact interface, the vehicle connection interface, the electrical characteristics of the DC supply and the communication system. It also covers the functional and dimensional requirements for the vehicle-connection interface and supply-equipment interface.

"As the electric bus market expands in the United States, it is imperative that we modify our standards and approach to ensure safer and more reliable usage," said Jack Pokrzywa, director of global ground vehicle standards, SAE International. "SAE J-3105 will guide this burgeoning industry to safe and efficient charging solutions that minimize downtime and promote long-term performance for heavy-duty applications."

In addition to the main J-3105 Recommended Practice document, there are also three supplemental Recommended Practices - J-3105-1, J-3105-2 and J-3105-3 - that address requirements for a specific interface defined in the supporting document. All connections will use the common requirements established in the overall J-3105 document.

- SAE J3105-1: Infrastructure-Mounted Cross Rail Connection covers the relevant connection-interface requirements for an



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electric vehicle power transfer system using a conductive automated-connection device based on a cross-rail design. (See figure 1)

- SAE J3105-2: Vehicle-Mounted Pantograph Connection covers the relevant connection-interface requirements for an electric vehicle power transfer system using a conductive automated-charging device based on a conventional rail vehicle pantograph design. (See figure 2)
- SAE J3105-3: Enclosed Pin and Socket Connection covers the main safety and interoperability relevant requirements for an electric vehicle power transfer system using a conductive automated-charging device based on an enclosed pin and socket design. (See figure 3)

The SAE Medium and Heavy-Duty Vehicle Conductive Charging Task Force committee, a part of the SAE International Hybrid EV group,

worked over the last four years to write J-3105 and follow it through the process to publication. "SAE J-3105 will help industry ensure that each connection type is safe and interoperable among manufacturers. The industry has been waiting for this Recommended Practice," said Task Force Committee Chair Mark Kosowski, who is technical executive for the Electric Power Research Institute (EPRI).

Many individuals have been involved in the standard development work with approximately 20-25 experts in regular attendance at Task Force meetings. Participants involved include bus OEMs BYD, Gillig, New Flyer, Nova Bus, Opbrid, Proterra; charger manufacturers ABB, Hellox and Siemens; pantograph and connector makers Schunk, Stäubli, Stemmann; utilities EPRI, Sacramento Municipal Utility District (SMUD), Southern California Edison (SCE); transit fleets APTA, Chicago Transit Authority, King County Metro, Los Angeles County Metropolitan Transportation Authority, NY City Transit, plus Argonne National Labs and CTE.

Visit [https://www.sae.org/standards/content/j3105\\_202001/](https://www.sae.org/standards/content/j3105_202001/) for more information or to purchase J-3105. ■



Figure 1. J-3105-1: Infrastructure-Mounted Cross Rail Connection



Figure 2. J-3105-2: Vehicle-Mounted Pantograph (Bus-up) Connection

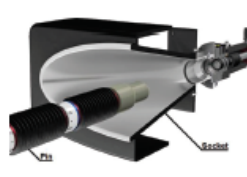


Figure 3. J-3105-3: Enclosed Pin and Socket Connection

FROM LEFT TO RIGHT: MARK KOSOWSKI/EPRI; JACK POKRZYWA/EPRI; STÄUBLI

SAE Standards news article being published in the SAE Automotive Engineering Magazine for January/ February 2020