EV High-Power Charging with Quick Charge Connector Assembly (Application of Boost Mode Operation)

1. Outline

Electric vehicles (hereinafter "EVs") and quick chargers have come into widespread use around the world toward achieving a decarbonized society. Sumitomo Electric Industries, Ltd. is supplying EV charge Cable with Connector "CHAdeMO conformity" for Quick Charger in the global market to connect EVs with quick chargers. SEVD-11 and SEVD-02, which are supplied by Sumitomo Electric, are shown in Photo 1, and their basic characteristics are shown in Table 1.

a) SEVD-11 b) SEVD-02

Photo 1. SEVD-11 and SEVD-02

Table 1. Basic characteristics

		SEVD-11	SEVD-02
Charging power		100 kW class	50 kW class
Rating (direct current)		500 V/200 A	500 V/125 A
Case		Aluminum	Plastic
Overall diameter of cable (maximum)		42 mm	30.2 mm
Weight	Connector	About 1.4 kg	About 0.8 kg
	Cable	About 2.73 kg/m	About 1.46 kg/m

Recently, there has been a growing need for high-power charging in line with the increasing capacity of EV batteries. This paper introduces the boost mode operation method, which can achieve high-power charging without cooling.

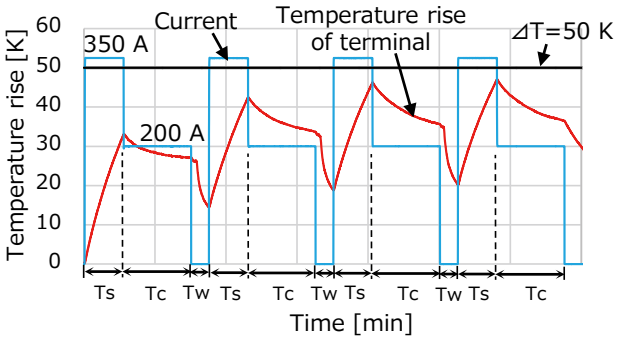
2. Introduction of the Boost Mode Operation Method

Boost mode is an operation method that meets temperature requirements by setting the output time of the continuous rated current and short-time rated current.

Figures 1 and 2 show the temperature rise test results of the connector terminals of SEVD-11 and SEVD-02, respectively, in boost mode operation on the assumption that the maximum charging time of public quick chargers is fixed per charging cycle.

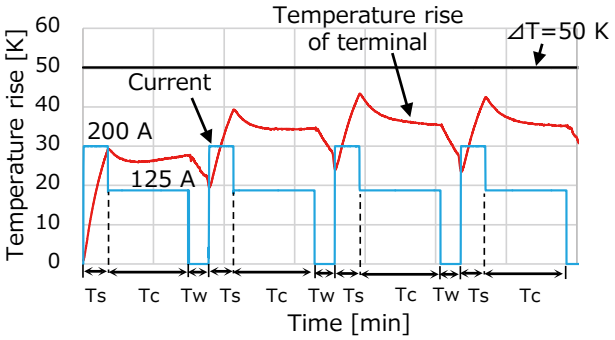
The characteristics of boost mode operation are as described below based on the test results of Fig. 1 and Fig. 2.

- The temperature rise of the connector terminal meets the temperature requirements (⊿T = 50 K or less) in repeated charging in boost mode. Thus, charging can be performed repeatedly without the need of monitoring the temperature.
- Waiting time (Tw) remains unchanged with repeated charging in boost mode.



Ts: short-time rated current (350 A) output time
Tc: rated current (200 A) output time
Tw: waiting (0 A) time

Fig. 1. The result of temperature rise test of SEVD-11



Ts: short-time rated current (200 A) output time
Tc: rated current (125 A) output time
Tw: waiting (0 A) time

Fig. 2. The result of temperature rise test of SEVD-02

Table 2 shows a comparison of charging power at charging in boost mode operation and charging with continuous rated current based on the current conditions of Figs. 1 and 2. SEVD-11 and SEVD-02 achieved the charging equivalent of up to 150 kW class and 90 kW class, respectively. Therefore, high-power charging becomes feasible in boost mode operation.

Table 2. Comparison of charging power

	SEVD-11	SEVD-02
Boost mode operation	Equivalent to 150 kW class	Equivalent to 90 kW class
Continuous rated current	100 kW class	50 kW class