

4. Conclusions and future work

A survey on appropriate technical standards and in addition, measurements of charging processes as well as fault simulations were carried out in practise and hereinafter the results were analysed and interpreted.

The evaluations of the field tests showed

- that the investigated DC EVCS comply with the production and safety standards in almost all situations;
- that the interruption of the PE conductor during a CHAdeMO (Asian standard) charging process will not be interrupted by the EVCS;
- that in some situations in case of an insulation fault the insulation monitoring device needs a long time to switch off the charging station.

As a next step a cooperation with a regional and internationally established manufacturer of test equipment was entered in order to develop and produce a mobile testing device for the periodic verification of DC-EVCS regarding the protection against electric shock.

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References

- [1] European Alternative Fuels Observatory, "Infrastructure stats / Electric vehicle charging infrastructure", <http://www.eafo.eu/electric-vehicle-charging-infrastructure> (accessed 2018-10-31).
- [2] Bloomberg New Energy Finance, "Sustainable Energy in America – Factbook 2018", <https://data.bloomberglp.com/bnef/sites/14/2018/02/Sustainable-Energy-in-America-2018-Factbook.pdf> (last downloaded 2018 10 31).
- [3] D. Herbst, Master Thesis: „DC-Ladestationen für Elektrofahrzeuge - Ein Beitrag zur Entwicklung einer Prüfmethode und Prüfeinrichtung zur Erst- und wiederkehrenden Prüfung von DC-Ladestationen für Elektrofahrzeuge“, Graz University of Technology – Institute of Electrical Power Systems, Graz/Austria, Sep. 2018.
- [4] IEC 61851-1:2017-02 "Electric vehicle conductive charging system – Part 1: General requirements", IEC – International Electrotechnical Commission, Geneva/Switzerland, Feb. 2017.
- [5] IEC/EN 61851 23:2014 "Electric vehicle conductive charging system – Part 23: DC electric vehicle charging station", IEC – International Electrotechnical Commission, Geneva/Switzerland, Mar. 2014.



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