TECHNICAL REFERENCE
TR 25 : 2010
(ICS 43.120)

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Electric vehicle charging system

Published by
SPRING Singapore
2 Bukit Merah Central
Singapore 159835
SPRING Singapore Website: www.spring.gov.sg
Standards Website: www.standards.org.sg

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ISBN 978-981-4278-43-0

First published, 2010

NOTE

1. *Users of this Technical Reference should refer to the relevant professional or experts for any technical advice on the subject matter. SPRING Singapore shall not be liable for any damages whether directly or indirectly suffered by anyone as a result of reliance on this Technical Reference.*

2. *Compliance with this Technical Reference does not exempt users from legal obligations.*

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Foreword

This Technical Reference was prepared by the Technical Committee on Electric Vehicles under the purview of the Electrical and Electronic Standards Committee (EESC). It was endorsed by EESC on 4 February 2010.

In early 2009, a multi-agency Electric Vehicle Taskforce was set up to spearhead the test-bedding of electric vehicles. The aim of the test-bedding programme is to evaluate the feasibility of operating electric vehicles in Singapore through road tests, and to identify and develop supporting infrastructure, especially electric vehicle charging systems for public use. This is to prepare Singapore for the adoption of electric vehicles in the future as the technology matures.

This Technical Reference was developed to serve as a best practice guide to facilitate the design, construction, operation and maintenance of an electric vehicle charging infrastructure. It also provides technical guidelines for charging of electric vehicles in domestic premises. The technical requirements are aligned with international practices and take into consideration local practices, and climatic and environmental conditions.

The Technical Reference is intended to be used as a reference by the infrastructure operators, electric vehicle and equipment suppliers, building owners, managing agents for buildings, consultants, licensed electrical workers, contractors, government agencies, etc.

It is envisaged that d.c. charging systems and other requirements will change as the technology evolves and such changes will be issued in the form of an addendum to this Technical Reference.

This Technical Reference is not to be regarded as a Singapore Standard. This Technical Reference is made available for provisional application over a period of two years, but does not have the status of a Singapore Standard. The Technical Committee aims to use the experience and feedback gained to improve the Technical Reference so that it can be further developed to a Singapore Standard. Users of the Technical Reference are invited to comment on its technical content, ease of use and any inadequacy. Any comment can be submitted using the feedback form provided at the end of the Technical Reference and will be taken into account in the review of the publication. At the end of the two years, the Technical Reference will be reviewed by the Technical Committee to discuss any comment received and to determine its suitability as a Singapore Standard. Submission for approval by the Standards Council as a Singapore Standard will be carried out only upon agreement after the review.

In preparing this Technical Reference, references were made to the following documents:

1. Singapore Standard SS CP 5 : 1998 Code of practice for electrical installations

2. IEC 61851 Electric vehicle conductive charging system
   – Part 1 General requirements, future IEC 61851-1 Ed. 2.0 (ref 69/160/CDV)
   – Part 1 : 2001 General requirements
   – Part 22 : 2001 AC electric vehicle charging station

3. IEC 61296 Plugs, socket-outlets, vehicle couplers and vehicle inlets – Conductive charging of electric vehicles
   – Part 1 : 2003 Charging of electric vehicles up to 250 A a.c. and 400 A d.c.
   – Part 2 Dimensional interchangeability requirements for a.c. pin and contact-tube accessories, future IEC 61296-2 Ed. 1.0 (ref 23H/223/CD)

Technical Reference for electric vehicle charging system

1 Scope and objective

1.1 Scope

This Technical Reference is applicable to on-board and off-board equipment for charging electric vehicles in public or private car parks, public places and private residential premises at standard a.c. supply voltages up to 1000 V and at d.c. voltages up to 1500 V.

It covers the requirements for electrical installation, functional needs and safety, and connection to the electric vehicle.

1.2 Objective

The objective of this Technical Reference is to provide guidelines for electric vehicle charging system that aligns with currently accepted international practices and takes into consideration local conditions. It states the safety requirements to protect person and property against electrical hazards.

2 Normative references

The following reference documents are indispensable for the application of this Technical Reference. For dated references, only the edition cited applies. For undated references, the latest edition (including any amendments) applies.

SS CP 5 : 1998	*Code of practice for electrical installations*
SS 97	*Residual current operated circuit-breaker without integral overcurrent protection for household and similar uses (RCCBs)* *Part 1 (2005) General rules*
IEC 60068	*Environmental testing* *Part 2-5 (1975)Tests – Test Sa: Simulated solar radiation at ground level* *Part 2-30 (1980) Tests – Tests Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)* *Part 2-52 (1996) Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)* *Part 2-75 (1997) Tests – Test Eh: Hammer tests* *Part 2-78 (2001) Tests – Test Cab: Damp heat, steady state*
IEC 60079	*Explosive atmospheres*
IEC 60245	*Rubber insulated cables. Rated voltages up to and including 450/750 V* *Part 1: General requirements* *Part 2: Test methods* *Part 3: Heat resistant silicone rubber insulated cables* *Part 4: Cords and flexible cables* *Part 6: Arc welding electrode cables*
IEC 60309	*Plugs, socket-outlets and couplers for industrial purposes* *Part 1: General requirements* *Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories*