NFPA 70:2014 National Electrical Code - Proposals for Article 625 Electric Vehicle Supply Equipment

The EPRI NEC Task Force (TF) reviewed the 2011 NEC to formulate change proposals for the 2014 NEC. Many issues were identified for possible 2014 code proposals for Article 625.

Early in 2011, NEC Code Making Panel (CMP) 12 formed a special task group of some CMP12 members to:

- reorganize and rewrite Article 625,
- to update the format and consider changes that could be proposed as Temporary Interim Amendments (TIA) to the 2011 NEC and as proposals for the 2014 edition of the NEC.

Amongst the reasons cited for the formation of the CMP 12 Task Group were to address the needs of builders, electrical contractors and building codes requirements including EV Ready requirements, pre-installation and site requirements, expedite permit and inspection process, expand the use of cord and plug connected EVSE, correctly identify the load being added, address load diversity and the use of energy management systems and so forth.

Both groups met several times during 2011, with an interchange of ideas, proposals and comments concluding in a meeting on October 30, 2011 when the last remaining concerns of EPRI's NEC TF were addressed in the CMP 12's final code proposal being submitted for consideration for the 2014 National Electrical Code. **As a result, EPRI's NEC TF did not make any direct proposals to Article 625 for the 2014 Code cycle**.

The proposed changes to Article 625 were:

- 625.1 – Added informational note to reference UL 2594, *Standard for Electric Vehicle Supply Equipment* and UL 2202, *Standard for Electric Vehicle Charging System Equipment.*
- 625.2 – Added definitions for Electric Vehicle Charging System and Electric Vehicle Supply Equipment System.
- 625.4 – Added DC system voltages of up to 600 volts to AC voltages listed to recognize DC power sources to equipment.
- 625.10 (E) – Modified to allow coupler without grounding pole for listed isolated EV charging systems.
- 625.13 (moved to 625.44) – TIA accepted.
- 625.14 – TIA accepted.
- 625.17 – Redefined EV cable as (A) Power Supply Cord and (B) Output Cable to EV. Identified cord and cable types for each. Requires (A) to be sized (ampacity) according to tables 400.5(A)(1) and 400.5(A)(2). Allows (B) to be sized (ampacity) as in (A) or based of equipment requirements and limitations.
- 625.30 – Adds Branch Circuit Markings for branch circuit installed for EVSE.
- 625.50 (was 625.29) – Generalized and changed Indoor Sites to Location.
- 625.52 (was 625.30) – Covered Ventilation requirements here.

Also, Article 220 revised to include EV charging as an additional standard load.

The CMP 12 group successfully proposed two TIAs that were accepted by NFPA's Technical Committee and **have been published as amendments to the 2011 Edition of the NEC**.

The two TIAs are effective only between editions of the National Electrical Code. Each TIA automatically becomes a proposal for the 2014 edition of the NEC, as such is then subject to all of the procedures of the codes and standards making process. TIAs are published in NFPA News, and are included with any further distribution of the 2011 National Electrical Code after being issued.

- One TIA (article 625-13) addressed the need to allow additional Electric Vehicle Charging Systems and Electric Vehicle Supply Equipment to be cord and plug connected directly to a branch circuit dedicated for EVSE and terminating in a suitably rated receptacle.
- The second TIA (article 625-14) addressed the need to permit the use of automatic load management systems with Electric Vehicle Charging Systems and Electric Vehicle Supply Equipment Systems.

TIA 625.13: http://www.nfpa.org/Assets/files/AboutTheCodes/70/TIA70-11-2.pdf

TIA 625.14: http://www.nfpa.org/Assets/files/AboutTheCodes/70/TIA70-11-3.pdf

NFPA News, November, 2011:
http://www.nfpa.org/assets/files/PDF/NFPA%20News/NFPANews1111.pdf

The NEC Task Force will reconvene mid-year 2012 to review the NEC Code Making Panel 12's initial actions, comments and remarks reported in the Report on Proposals (ROP). The NEC TF may submit further comments or proposals may submit by Oct. 17, 2012 in response to the Code Panel's CMP 12 actions.

IEC Update

International Electrotechnical Commission (IEC) Sub-Committee SC23H

SC23H, its Project Teams (PT) and Maintenance Team (MT8) published the following Standards:

- IEC 62196-1, 2nd Edition, October 2011, *Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements.*

  IEC 62196-1 is applicable to plugs, socket-outlets, connectors, inlets and cable assemblies for electric vehicles (EV), herein referred to as "accessories", intended for use in conductive charging systems which incorporate control means, with a rated operating voltage not exceeding:

  - 690 V a.c. 50 Hz - 60 Hz, at a rated current not exceeding 250 A,
  - 1,500 V d.c. at a rated current not exceeding 400 A.

- IEC 62196-2, October 2011, *Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories*.

  IEC 62196-2 applies to plugs, socket-outlets, vehicle connectors and vehicle inlets with pins and contact-tubes of standardized configurations, herein referred to as accessories. They have a nominal rated operating voltage not exceeding 500 V a.c., 50 to 60 Hz, and a rated current not exceeding 63 A three-phase or 70 A single phase, for use in conductive charging of electric vehicles.

  This standard covers the basic interface accessories for vehicle supply as specified in IEC 62196-1, and intended for use in conductive charging systems for circuits specified in IEC 61851-1.

Because of the continually changing technology, SC23H, MT8 have called for a revision process for IEC62196, Parts 1 and 2, to start in 2012. China has requested that Part 2 be amended to add a basic unique AC coupler they use in their country.

- SC23H, PT 62196-3 continues working on a new Part 3, *Dimensional compatibility and interchangeability requirements for dedicated d.c. and combined a.c. / d.c. pin and contact-tube vehicle couplers*. The scope of the standard includes both d.c. couplers and a combined interface for couplers that will permit either the connection of an AC or DC supply source thru a single inlet.

  Another working draft containing many editing changes has just issued for review and comment before the CD is issued. It contains technical changes shown as “under consideration” that still need to be accepted by IEC TC 69, WG4 for inclusion in IEC 61851. The CD will follow for comment by National Committees. Publication is targeted for the first half of 2013.

International Electrotechnical Commission (IEC) Technical Committee No. 69

- IEC 61851-1, 2nd Edition, November, 2010. *Electric Vehicle Conductive Charging System*.

  IEC 61851-1 applies to on-board and off-board equipment for charging electric road vehicles at standard a.c. supply voltages up to 1 000 V and at d.c. voltages up to 1 500 V, and for providing electrical power for any additional vehicle functions if required when connected to the supply network. It includes characteristics and operating conditions for the EV coupler for connection to the vehicle and safety with respect to the charging system and vehicle using a.c. / d.c. charging stations, when the EV is earthed.

The maintenance (revision) work is being started in 2012 to include several improvements including consideration of coupler constructions presently not permitted by 61851-1.

- IEC 61851- 21, 1st Edition, 2001, *Electric vehicle requirements for conductive connection to an a.c. / d.c. supply*.

  This part covers additional requirements for the electric vehicle when connected to the EV supply equipment. After considerable discussion with ISO TC22 SC21, it was decided to split this part into an IEC standard (Part 21) addressing the charging equipment and a new ISO standard 17049 to address the vehicle requirements affecting the charging system. Initial discussions regarding this partitioning occurred in September 2011, with several meetings planned in 2012. Both electromagnetic compatibility and generated EM disturbances, electrical back feed from the vehicle through the branch circuit to the utility grid are to be addressed.

- IEC 61851- 22, 1st Edition, 2001, *AC electric vehicle charging station*.

  This part covers specific requirements for a.c. supply equipment providing electrical energy to the EV. Improvements have been proposed. Following the last CD, the comments received were reviewed during a meeting in November, 2011 in conjunction with Part 21. A decision was reached during this meeting to begin a revision process for 61851-1 and to consolidate the common requirements in both Parts 22 and 23 into Part 1. Following this work, a CDV for further comment and vote is planned.

- IEC 61851-23: *d.c. electric vehicle charging station*.

  Work began July 2010. After several meetings to resolve many comments on the working drafts, a CD was issued in December. Comments are due at the beginning of March from NCs, for discussion at a May, 2012 meeting of PT 61851-23 in Japan.

- IEC 61851- 24: *Control communication protocol between off-board d.c. charger and electric vehicle.*

  PT 61851-24 is working to define the communications needed between the high power dc charging equipment and the PEV. It covers the physical layer, the data link layer, the application layer and other layers as needed. The PT met twice in 2011 while working on the draft document. A CD is planned for early 2012 for review and comment. The comments received will be discussed at a planned May, 2012 meeting in Japan.

IEC TC 69 is working with ISO TC22 under a joint ISO/IEC working group (JWG) to develop the new IEC 15118 series standards for Road vehicles - Vehicle to grid communication interface. These include:

- ISO/IEC 15118-1 *Road vehicles - Vehicle to grid communication interface - Part 1: General information and use-case definition,*
- ISO/IEC 15118-2 *Road vehicles - Vehicle to grid communication interface - Part 2: Technical protocol description and open systems interconnections (OSI) layer requirements*, and
- ISO/IEC 15118-3 *Road Vehicles - Vehicle to grid communication interface - Part 3: Physical layer and Data Link layer requirements*

CD's have been issued for all documents. Comments were received for parts 1 and 2. They are being addressed. The closing date for comments for Part 3 is in January 2012.