EVSE Standards Status

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Charging Configurations and Ratings

EVSE STANDARDS STATUS

Proposed SAE Charging Configurations and Ratings Terminology

- **AC L1:** 120V AC single phase
  - Configuration current 12, 16 amp
  - Configuration power 1.44, 1.92kw
- **AC L2:** 240V AC single phase
  - Rated Current ≤ 80 amp
  - Rated Power ≤ 19.2kw
- **AC L3:** TBD
  - AC single or 3ϕ ?

- **DC L1:** 200 – 450V DC
  - Rated Current ≤ 80 amp
  - Rated Power ≤ 36kw
- **DC L2:** 200 – 450V DC
  - Rated Current ≤ 200 amp
  - Rated Power ≤ 90kw
- **DC L3:** TBD
  - 200 – 600V DC ?
  - Rated Current ≤ 400 amp?
  - Rated Power ≤ 240kw?

Voltages are nominal configuration operating voltages, not coupler rating.
Rated power is at nominal configuration operating voltage and coupler rated current.

Document Status

EVSE STANDARDS STATUS

J1772™ Revision Plan (No DC)

- Workgroup has been meeting via WebEx
- Workgroup has completed reviewing proposal list
- Draft document has been surveyed to obtain additional comments.
- Targeted publication, summer

J1772™ Revision Plan

- Revision to include:
  - Editorial corrections
  - Technical corrections
  - Charging configurations and ratings definitions
  - EVSE compatibility test (new Appendix)

J1772™ Revision Plan (w/ DC)

- Revision to include:
  - DC Charging configurations and ratings definitions
  - DC coupler dimensional information
  - Editorial corrections
  - Technical corrections
- Targeted publication December 2011

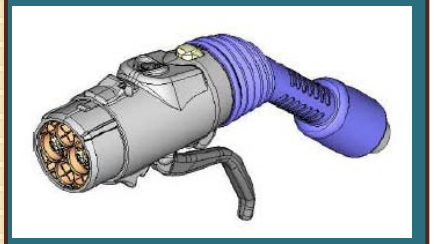
DC Fast Charge Standardization

EVSE STANDARDS STATUS

Charge Couplers

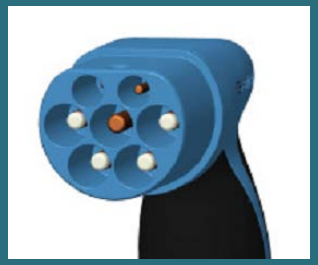
AC Connector:
Japan
SAE J1772™

DC Connector:
CHADEMO
Japan



Configuration A

AC Connector:
China



DC Connector:
China

Configuration B

AC/DC
Connector:
IEC 62196-3
EU Combo 2

AC/DC
Connector:
SAE J1772™
NA Combo 1

Configuration C

DC Charging Configurations

- **Configuration A (CHADEMO)**
  - **EVSE and vehicle share safety critical functions**
  - **EVSE performs isolation monitoring during charge**
  - **“Functional” earth concept used to reduce size of ground conductor**
  - **“Functional” earth requires EVSE listing as a system**
  - **Requires unique control and communications interfaces not compatible with current SAE J1772™**
  - **CAN communications for charge control**
  - **Requires additional communications for features such as V2H/G, and other customer value added features**
  - **Requires dedicated vehicle inlet in addition to AC charge inlet**

DC Charging Configurations

- **Configuration B (China)**
  - **Still working to understand system interfaces and control**
  - **Protective Earth grounding concept**
  - **Requires unique control and communications interfaces not compatible with current SAE J1772™ or IEC**
  - **CAN communications for charge control**
  - **Requires additional communications for features such as V2H/G, and other customer value added features**
  - **Requires dedicated vehicle inlet in addition to AC charge inlet**

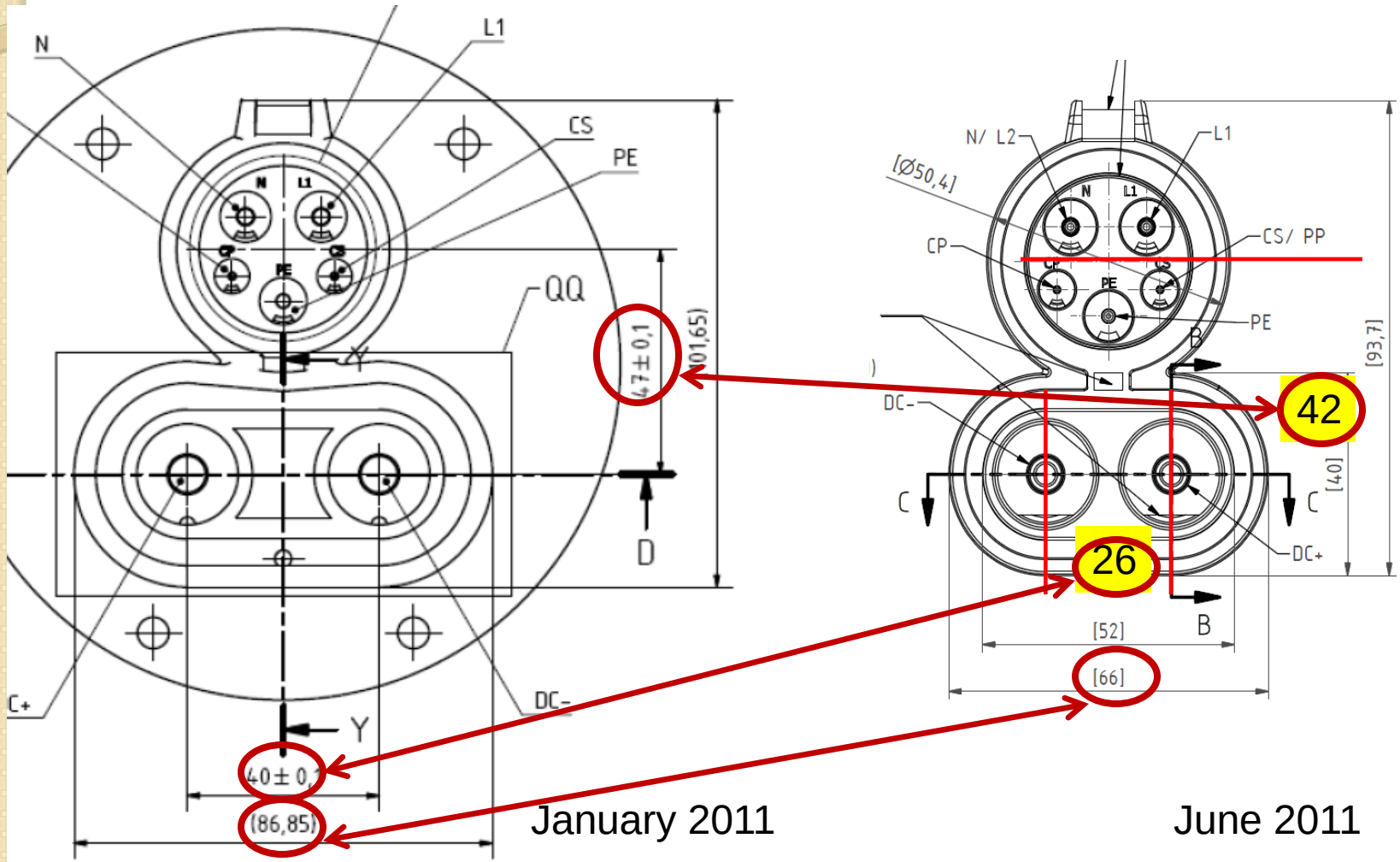
DC Charging Configurations

- **Configuration C (Combo 1 (SAE) Combo 2(IEC))**
  - **Vehicle controls all safety critical functions during charge**
  - **Protective Earth grounding concept**
  - **Compatible with current SAE J1772™ and IEC**
  - **Power Line Communications (PLC) for charge control and other features (V2H/G) offers “future proof” high bandwidth communications with vehicle**
  - **Combo inlets are compatible with SAE J1772™ and IEC AC charging**

DC Charging Configurations

Configuration Characteristic	Configuration A CHADEMO	Configuration B China	Configuration C Combo 1 & 2
Safety Critical Functions During Charge	EVSE & Vehicle	TBD	Vehicle
Ground Strategy	“Functional” Earth	Protective Earth	Protective Earth
Vehicle to EVSE Digital Communication	CAN	CAN	PLC
Control Interfaces	Unique	Unique	J1772™ Based
V2H/V2G/HAN Communication	Additional Communication Required	Additional Communication Required	Included in PLC
Total Number Of Inlets Required For AC & DC Charge	2	2	1

DC Combo Goes On A Diet



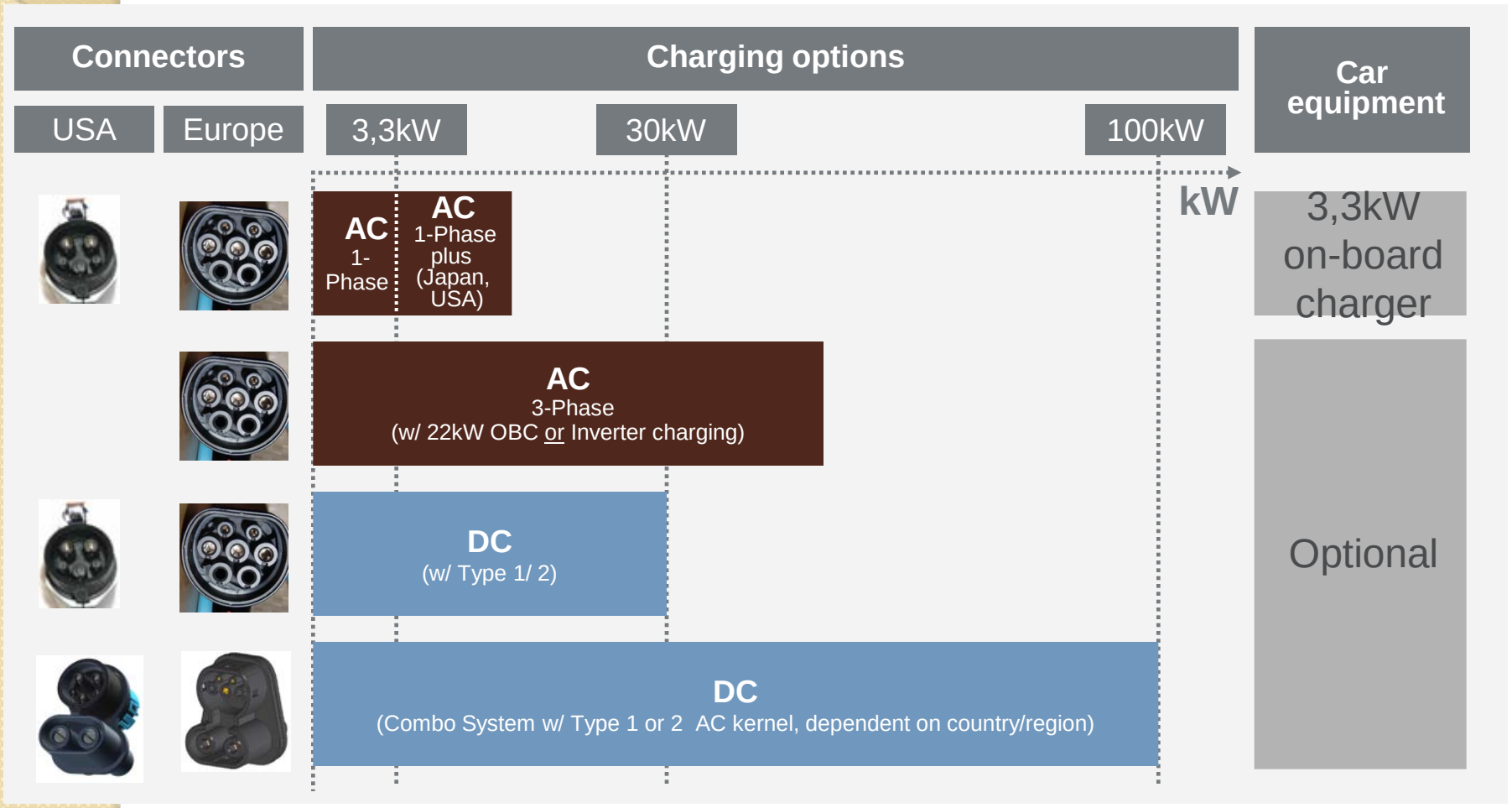
January 2011

June 2011

Size Reduction Enablers

- Removed provision for CAN pins
- Reduced DC terminals from 8.5mm to 8.0mm
- Revised DC sealing strategy
- Integrated AC keyway into DC terminal outer ring

Combo Coupler Power Levels



Other Items

EVSE STANDARDS STATUS

China Update

- State Grid Rationale for swapping
  - Charging at home is not possible
  - Since home charging is not possible, all charging would be DC fast charging resulting in 50% reduction in battery life
  - 20-30 minute charge time is not efficient from asset use or convenient for a customer as a primary means to charge
  - Fast charge has negative affects on the grid
- There are currently 87 swap stations
- Battery delivery vehicles can be used in remote or less populated areas and require no land purchase.

China Update

Comparison of charging modes

No.	Items	Battery Swapping	AC Charging	DC Charing
1	Charging time	3~5 minutes	6~12 hours	1~3 hours
2	Battery maintenance	Professional maintenance and management	Lack maintenance and management	Lack maintenance and management
3	Battery life	Relatively long	Relatively short	Shortened dramatically
4	Influence on power grid	Balancing peak and valley	Big influence on gird once in large scale	Big influence
5	Influence on customers	Resolve the concerns for battery life, cost and performance	Concerns for battery life, cost	Concerns for battery life, cost

China Update

Standardized battery pack

Universality, interchangeability and compatibility

Electric interface for battery pack

China Update

Battery pack swapping equipment

Battery storage rack

Battery delivery vehicle