

ภาคผนวก 1

SPECIFICATION OF 120 kW QUICK CHARGER

1. SCOPE OF WORK

This specification describes the requirements with which the manufacturer shall comply in order to supply 35 of 120 kW quick chargers or better to the Metropolitan Electricity Authority (MEA)'s charging station.

2. SITE AND SERVICE CONDITIONS

The quick chargers shall be installed in the Bangkok, Samut Prakan and Nonthaburi, Thailand. The service conditions are as follows:

- Installation site: Outdoor under the roof or the station and still air.
- Maximum ambient temperature: 50 °C
- Maximum relative humidity in any one year: 90%
- Altitude: Approximately mean sea level.

The quick chargers shall be suitable for use in tropical climatic area and shall be capable of operating at its full ratings in the service conditions mentioned above.

3. REFERENCE STANDARDS

Except otherwise specified elsewhere in the specification, the equipment required by MEA shall be manufactured and tested in conformity with the standard lists below:

TIS 61851 Part 1 2560 (2017)

TIS 61851 Part 21 2560 (2017)

TIS 61851 Part 22 2560 (2017)

TIS 61851 Part 23 2560 (2017)

TIS 61851 Part 24 2560 (2017)

TIS 2749 Part 1 2559 (2016)

TIS 2749 Part 2 2559 (2016)

TIS 2749 Part 3 2559 (2016)

or

IEC 61851-1 2010

IEC 61851-23 2014

IEC 61851-24 2014

IEC 61851-1 2017

IEC 62196-1 2014

IEC 62196-2 2016

IEC 62196-3 2014

Note

1. The equipment tested in accordance with the later version of the above standard is also accepted.

2. If there are any minor parts that deviated from the standards, they shall be clearly mentioned in the "DEVIATION FROM MEA'S SPECIFICATION FORM" attached herewith.

4. CERTIFICATE OR TEST REPORT

- 4.1 The supplier must submit the certificate or test report of the proposed model from the third-party testing laboratory to MEA as follows:
 - 4.1.1 Certificates or Test report for charger complies with IEC 61851 or TIS 61851 Standard.
 - 4.1.2 Certificates or Test report for DC plug CCS (COMBO 2)
 - 4.1.3 Certificates or Test report for display screen complies with International Standard.
- 4.2 The supplier is required to successfully pass all the tests of the Proof of Concept Test (POC) in accordance with ภาคผนวก 2 การทดสอบการใช้งาน, performed by MEA only and attached the test report to the bid.

5. TECHNICAL REQUIREMENTS

- 5.1. AC POWER INPUT
 - 5.1.1. Power : ≥ 120 kW
 - 5.1.2. Voltage : 400 $\pm 10\%$ V, 3 Phase 4 Wire
 - 5.1.3. Frequency : 50 Hz
 - 5.1.4. Power Factor : 0.97
- 5.2. DC POWER OUTPUT
 - 5.2.1. Power : ≥ 120 kW
 - 5.2.2. Efficiency : $\geq 93\%$
 - 5.2.3. Charging mode : Mode 4
 - 5.2.4. Case of EV connection : Case C
- 5.3. DC PLUGS
 - 5.3.1 Reference Standard : IEC 62196-3
 - 5.3.2 DC plug 1 : CCS (COMBO 2)
 - 5.3.3 DC plug 2 : CCS (COMBO 2)
- 5.4. MECHANICAL SPECIFICATIONS
 - 5.4.1. Ingress Protection Rating : IP 54 (minimum)
 - 5.4.2. IK Code (Enclosure) : IK 10 (minimum)
 - 5.4.3. Charging Cable Length : 6 m (minimum)
- 5.5. PROTECTION
 - 5.5.1. Over Current
 - 5.5.2. Over and Under Voltage
 - 5.5.3. Surge Protection
 - 5.5.4. Short Circuit
 - 5.5.5. Over Temperature
 - 5.5.6. If the transformer of the quick charger is not isolated type, the supplier shall be provided and install with RCD (Residual Current Device) type B

Note 1:

RCD type A or F can be used. But must be used with devices that disconnect the circuit if there is a direct current (d.c. fault current) over 6 mA (RDC-DD).

Note 2:

RCD Type A complies with TIS 909, TIS 2425 or IEC 60947-2 annex B

RCD Type B and Type F complies with TIS 2955 or IEC 62423

RDC-DD complies with IEC 62955

5.6. DISPLAY SCREEN

- 5.6.1.Type : TFT or better
- 5.6.2.MTBF Backlight at 25 °C : ≥43,000 hours
- 5.6.3.Display Indicator : Operating, Out of service, Stand by
: Charging time
: Output energy (kWh)
: Warning message
- 5.6.4.Display cover : Designed to be able to prevent sunlight
(with drawing attached)

5.7. COMMUNICATION AND PROTOCOL

- 5.7.1. Communication technology : 3G/4G (or better) Communication and LAN
- 5.7.2. Protocol : OCPP 1.6 JSON, includes remote functional from MEA OCPP Server as follows;
 - Start/Stop
 - Reserved
 - Set charging profile
(control charging current or power)
- 5.7.3. The OCPP 1.6 JSON Protocol (Clause 5.7.2) must pass the test from MEA (the test report/ Certificates must be attached.).

5.8. USER AUTHENTICATION AND COMMUNICATION

- 5.8.1. The quick charger shall have user authentication.
- 5.8.2. User authentication by RFID (Mifare) and QR Code
- 5.8.3. “Autocharge” function is optional.
Autocharger function means the quick charger shall directly communicate and authenticate with electric vehicles bypassing other authentications such RFID and application.

6. CHARGING OPERATION

An output current, start/stop of charging or other necessary information shall be configured in accordance with the instruction of the EV and types of battery during the charging.

7. EMERGENCY SWITCHING

- 7.1. Must have an emergency stop button in the appropriate position.
- 7.2. An emergency disconnection device shall be installed to isolate the AC supply network (mains) from the quick charger in case of risk of electric shock, fire or

explosion. The disconnection device shall be provided with a means to prevent accidental operation.

- 7.3. Emergency stop button: After pressed Emergency stop button during normal operation should be back to normal function by release button no need to open cabinet and reset at MCCB

8. STORAGE MEANS FOR THE CABLE ASSEMBLY

A storage means shall be provided for the cable assembly and vehicle connector when not in use. The storage means provided for the vehicle connector shall be located at a height between 0.4 m and 1.5 m above ground level.

9. MARKING

9.1. LEGIBILITY

The marking required by this specification shall be legible with corrected vision, durable and visible during use.

9.2. MARKING OF THE QUICK CHARGER

The quick chargers shall bear the following markings in a clear manner:

- Name or initials of manufacturer;
- Equipment reference;
- Serial number;
- Date of manufacture;
- Rated voltage in V;
- Rated frequency in Hz;
- Rated current in A;
- Number of phases;
- Some minimal additional information can possibly appear on the quick charger itself (phone number, address of contractor)

- 9.3. The quick charger should be decorated as attached Annex C

10. DELIVERY AND INSTALLATION

- 10.1. The proceedings in clause 10.1.1-10.6 suppliers must be responsible for all costs incurred, including

10.1.1 Cost for verifying test report per charger's model from Electrical and Electronic Products Testing Center (PTEC) responses by suppliers. PTEC will verify the documents and issue verify report to confirm chargers followed the standards to suppliers. Suppliers shall provide documents for verification as follows:

10.1.1.1 ISO/IEC 17025 certificate and testing scope of lab test.

10.1.1.2 Test report of EV charger under IEC 61851 – 1: 2017, IEC 61851 – 23: 2014 and IEC 61851-21-2: 2018.

10.1.1.3 Certificate of DC plugs

- DC-CCS Combo acc. to IEC 62196-1, IEC 62196-3

The suppliers must be submitting verify report from PTEC and document in clause 10.1.1.1 – 10.1.1.3 to MEA before delivery to warehouse.

10.2. Before the installations, MEA shall perform warehouse test with sample 10% of contract but not less than 4 units for warehouse test (the decimal fraction must be rounded up to 1). which have detailed as follows:

10.2.1 Testing costs incurred, under clause 10.2 per charger per time and responds by Suppliers.

10.2.2 Annex A CCS Test issues, which refer to IEC or TIS 61851-23, 61851-24 standard. The test shall be tested at the supplier's warehouse, the supplier shall provide the factory test report of those particular tests before delivery.

10.2.3. The suppliers must be responsible for all costs such as store chargers in the supplier warehouse, transportation, insurance costs and etc. Suppliers must be responsible for any charger defects under this process.

10.2.4 Annex B EV charging protocol testing: OCPP1.6 JSON Protocol, includes remote functional from MEA OCPP Server in clause 5.7.2. The warehouse test shall be tested at supplier's warehouse.

10.2.5 The suppliers shall submit the documents as bellowed;

10.2.5.1 The 2 copies of test reports from the Electrical Equipment Testing Division (ETD) of MEA as specified in clauses 10.2.1 and 10.2.2.

10.2.5.2 The documentation specified the firmware version of the delivery quick chargers.

10.3. If charger do not pass at least one in first time test, as clauses 10.2, MEA will repeat the process in clauses 10.2 for the second time with sampling 10% of contract. The result of the test shall be as follows:

10.3.1 if the tests at the second time pass all chargers, the supplier shall deliver new units replacing all the units that do not pass the test at the first time.

10.3.2 If charger do not pass at least one in the second time, MEA will reject all chargers and all the expenses occurring shall be responded by the supplier. The supplier must deliver all chargers of contract in the new condition to MEA and repeat the warehouse test in clause 10.2 and 10.3. The supplier cannot be used as an excuse for late delivery.

10.4. The supplier shall deliver chargers within 90 (ninety) days to supplier's warehouse after Date of Order/Contract. Then, MEA shall perform warehouse test for clause 10.2 - 10.3 within 14 (fourteen) days after the chargers are delivered at the warehouse. When the warehouse test is passed and the supplier receives the document of officially installed location site from MEA. The supplier shall install the charger at the location according to the list within 7 (seven) days. MEA shall perform the functionality test of all chargers and suppliers must be responsible for all costs incurred.

10.5 MEA will advise the supplier the starting date of the functionality test of each site 7 (seven) days in advance. If the supplier. After being informed by MEA. Does not acknowledge the date of the commencing of the test of each site at appropriate time, counting for the commencing of the test shall be started automatically 7 (seven) calendar days from the commencing date informed by MEA .The supplier's offer shall be rejected if it is quoted with longer period. The installation and test of all chargers shall be in accordance with the attached drawings and detailed specifications and shall be completed for 12 groups (3 chargers per group) within 12 (twelve) days. All chargers must be tested for functionality as follows:

10.5.1 Testing costs under clause 10.5 per unit per time

10.5.2 MEA will test functionality in according to Annex A CCS Test items refer to IEC or TIS 61851-23, 61851-24 standard. (suppliers must be responsible for all costs incurred)

10.5.3 MEA will test EV Charging protocol: The OCPP 1.6 JSON in clause 5.7.2. which have detail according to Annex B (suppliers must be responsible for all costs incurred)

If any chargers fail the test on clause 10.5.2 and 10.5.3, the supplier must deliver new units to replace the failed units to MEA, and repeat the testing process on clause 10.5.2 -10.5.3

Remark: Suppliers shall provide appropriate EVs for functionality test (commissioning test) on clauses 10.5.2 and 10.5.3 with MEA and suppliers must be responsible for all costs.

10.6 If there is force majeure causing cannot proceed according to clause 10.2, clause 10.5 (not within the scope of the supplier's responsibility), the supplier must notify the Metropolitan Electricity Authority as soon as possible for proceed with the consideration of the solution to the problem.

11 PENALTY FOR LATE DELIVERY AND COMPLETION

11.1 In case of delay on delivery at supplier's warehouse, warehouse test, the supplier shall be claimed at the rate of 0.2 (one-fifth of one) per cent of the price of each charger rate late delivered per each calendar day of delay.

11.2 This clause is also applied to the delay in the completion of the supervision installation, commissioning the supplier(s) shall be claimed at the rate 0.2 (one-fifth of one) percent of the total price of each charger per each calendar day of day.

11.3 However, the total claim amount under Sub Clause 11.1 and 11.2 shall not exceed 10 (ten) percent of the total contract price.

12 DOCUMENTATION AND SOFTWARE

12.1. The Charger shall be accompanied by non-proprietary Service Manuals for parts, service, operation, and maintenance. Included should be detailed on the design and operation of the Quick Charging Station, as well as prices and availability of parts and service and a list of additional or special maintenance tools required.

- 12.2. Suppliers shall provide sufficient information, drawings, installation guide necessary for the proper civil construction and electrical installation of the Quick Charging Station.
- 12.3. Suppliers shall provide the information of communication protocol between the Quick Charging Station and EV.
- 12.4. In case, updating software for latest version, supplier shall be informing any added features for updated version to MEA consider allowing or verifying according to clause 5.7.2 before every updates.

13. TRAINING PROGRAM

Suppliers shall furnish qualified and experienced personnel (s) to carry out the training program for the purchaser covering the Charger safety and proper or relevant operation of the Charger for at least 5 hours within 1 day for number of not less than 10, but not exceed 15 for MEA staff at Better Care and Power Quality Department location.

14. SERVICE AND MAINTENANCE

- 14.1. Suppliers shall provide services and maintenance according to the service manual.
- 14.2. Suppliers shall provide preventive maintenance at least 1 time per year throughout the warranty. With the check items, at least as follows:
 - 14.2.1. Check of EV Charger exterior
 - 14.2.2. Check of Display, touch screen and all buttons
 - 14.2.3. Check of door mechanism
 - 14.2.4. Check of Charging plug and cable
 - 14.2.5. Check of RFID function
 - 14.2.6. Check of Antenna (3G/4G Modem)
 - 14.2.7. Replacement of air filters (if any)
 - 14.2.8. General cleaning of the EV Charger
 - 14.2.9. Check of Ground fault auxiliary relay
 - 14.2.10. Test of Insulation resistance (main supply and dc. plug)
 - 14.2.11. Test of earth fault loop impedance
 - 14.2.12. Test of Residual Current protection (RCD)

14.3. During the period of warranty in **clause 15**, If there are any defects due to normal usage, the supplier shall inspect and diagnose the cause of defect within 24 (Twenty-four) hours a day, seven days a week after receiving notification by, and replace, re-furnish with size, quantity and quality equivalent otherwise correct the defective supplies or part thereof to the installation site indicated by MEA. The supplier liable for the full expenses of such replacing, or re-furnishing of supplies.

The repairing or deliver new supplies for replacement, suppliers shall repair or deliver new supplies for replacement completed within 7 (seven) days after receiving official notification by MEA, if the supplier, having been notified, fails to remedy the defect(s) within such period, MEA may proceed to take such remedial action as may be necessary, The supplier liable for the full expenses of such replacing or re-furnishing of supplies.

The obligations of this clause shall then continue in force in respect of re-furnished and replaced supplies for an equal period of time which is spent for such re-furnishing or replacing and is counted from the date on which the Supplier receives notification until the date on which the supplier delivers to MEA the re-furnished supplies in good working condition or the new supplies for replacement.

15. WARRANTY

The Warranty period shall be 2 (two) years after the acceptance date of all supplies and services of the Work in the Final Acceptance Certificate.

15.1. If supplies have any defects due to normal usage within first year of warranty period, supplier shall extend warranty period on defect charger farther 2 years.

15.2. If supplies have any defects due to normal usage within second year of warranty period, supplier shall extend warranty period on defect charger farther 1 year.