

ED-308

GUIDANCE ON VTOL CHARGING INFRASTRUCTURE

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FOREWORD

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CHAPTER 1

INTRODUCTION

1.1 PURPOSE AND SCOPE

This document contains Guidance for VTOL Charging Infrastructure.

Compliance with this standard is recommended as one means of assuring that the equipment will perform its intended function(s) satisfactorily under all conditions normally encountered in routine aeronautical operation.

The equipment may also have additional functions, for which other MOPS or ETSOs may be applicable, or it may contain additional functions not defined by any MOPS or ETSO, and non ETSO function guidance may be applicable.

1.2 APPLICATIONS

Compliance with this standard by manufacturers, installers and users is recommended as a means of assuring that the equipment will satisfactorily perform its intended function(s) under all conditions normally encountered in routine aircraft operations.

Any regulatory application of this document in whole or in part is the sole responsibility of appropriate government agencies.

As the measured values of equipment performance characteristics may be a function of the method of measurement, standard test conditions and methods of test are recommended in this document.

1.3 DESCRIPTION OF EQUIPMENT/FUNCTION

This guidance document applies to electric vehicle supply equipment (EVSE) designated to conductively charge high voltage (HV) electrical energy for vertical take-off and landing aircraft (VTOL) at vertiports.

This technical standard is a collection and extension of applicable standards for the development, commissioning, and operation of EVSE in other industries, e.g. for automotive applications. These applicable standards are referenced in their relevant section for ease of cross reference.

In an earlier exploration phase, the EUROCAE Working Group had identified the novel Megawatt Charging System (MCS) to be used by the European aviation industry for VTOL charging. MCS is expected to be standardised and rolled-out in several years' time after the first publication of this document. As a first step, the approach is to apply the largely available Combined Charging System (CCS) now to provide a readily available solution. As a second step, a future release of this document will extend the scope to MCS as soon as this standard is sufficiently described and matured.

Similar to other Ground Support Equipment (GSE) that enables the operation of a vertiport, the vertiport operator shall collect the declarations of conformity for the EVSE and provide them to the relevant government agencies. The EVSE's declaration of conformity to this and other technical standards shall be provided by the EVSE manufacturer.

This technical standard is applicable for the EVSE on ground, which provides electrical charging for battery systems that remain onboard a VTOL. Battery swapping systems are not considered here. Other battery conditioning systems, e.g. cooling or heating equipment, or low voltage charging equipment are deliberately excluded from the scope of this document.

The performance of any VTOL equipment, e.g. charging inlet or battery system, is not within the scope of this document. Charging requirements for VTOLs are defined in the relevant means of compliance with [SC-VTOL], e.g. [DO-311A] or [MOC-3 SC-VTOL]. To correctly operate with an EVSE, the VTOL is expected to comply with [ISO 17409:2020]. Every clause in this document, which allows a diversion of the vehicle from [ISO 17409:2020] will be explicitly stated.

1.4 DEFINITIONS AND ABBREVIATIONS

TABLE 1-1: LIST OF ABBREVIATIONS

CCS	Combined Charging System
ETSO	European Technical Standard Order
DC	Direct Current
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
GSE	Ground Support Equipment
HV	High voltage
iaw	in accordance with
IMD	Isolation Monitoring Device
LV	Low voltage
MCS	Megawatt Charging System
MOPS	Minimum Operational Performance Standard
VTOL	Vertical Take-off and Landing aircraft

1.5 REFERENCES

TABLE 1-2: LIST OF REFERENCES

[ARP 4761]	Guidelines and Methods for Conducting the Safety assessment Process on Civil Airborne Systems and Equipment"	Issued 1996-12
[ED 79A / ARP 4754A]	Guidelines for Development of Civil Aircraft and Systems	Revision A, 2010-12
[DC CCS Power Classes V7.2]	Position Paper of Charging Interface Initiative e.V.	Issued 2021-12-09
[DO-311A]	Minimum Operational Performance Standards for Rechargeable Lithium Batteries and Battery Systems	Revision A, 2017-12
[ED-299]	EUROCAE "Guidance for Vertiport Operations and Operations"	Published June 2022
[IEC 60479-1:2018]	Effects of current on human beings and livestock – Part 1: General aspects	Edition 1.0, 2018-12
[IEC 60664-1:2020]	Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests	Edition 3.0, 2020-5
[IEC 61140:2016]	Protection against electric shock – Common aspects for installations and equipment	Edition 4.0, 2016-01
[IEC 61851-1:2017]	Electric vehicle conductive charging system – Part 1: General requirements.	Edition 3.0, 2017-02
[IEC 61851-23:2014]	Electric vehicle conductive charging system – Part 23: DC electric vehicle charging station.	Edition 1.0, 2014-05
[IEC 61851-23: 2 nd Edition]	Electric vehicle conductive charging system – Part 23: DC electric vehicle charging station. 2 nd Edition	Edition 2.0, <i>Not Published</i> Due in 2023

[IEC 61851-23-3]	Electric vehicle conductive charging system – Part 23: DC electric vehicle charging station – Megawatt charging systems	Edition 1.0, <i>Not Published</i> Due in 2025
[IEC 62196-3:2014]	Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 3: Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contact-tube vehicle couplers	Edition 1.0, 2014-06
[IEC 62196-3-1:2020]	Plugs, socket-outlets, vehicle connectors and vehicle inlets – Conductive charging of electric vehicles – Part 3-1: Vehicle connector, vehicle inlet and cable assembly for DC charging intended to be used with a thermal management system	Edition 1.0, 2020-03
[ISO 15118-1]	Road vehicles — Vehicle to grid communication interface — Part 1: General information and use-case definition	Edition 2.0, 2019-04
[ISO 15118-3]	Road vehicles — Vehicle to grid communication interface — Part 3: Physical and data link layer requirements	Edition 1.0, 2015-05
[ISO 17409:2020]	Electrically propelled road vehicles — Conductive power transfer — Safety requirements	Edition 2.0, 2020-02
[ISO 5474-3]	Electrically propelled road vehicles — Functional requirements and safety requirements for power transfer — Part 3: DC power transfer	Edition 1.0, <i>Not Published</i> Due in 2023
[ISO 6469-3:2018]	Electrically propelled road vehicles — Safety specifications - Part 3: Electrical Safety	Edition 3.0, 2018-10
[MOC-3 SC-VTOL]	Third Publication of Proposed Means of Compliance with the Special Condition VTOL	Issue: 1, 2022-06
[SC-VTOL]	Special Condition Vertical Take-Off and Landing (VTOL) Aircraft	Issue: 1, 2019-07

1.6 RELATIONSHIP TO SC VTOL

While this standard was developed with the European legal framework in mind, namely the EASA Special Condition VTOL ([SC-VTOL]), it may be applied to support other regulatory frameworks.

With regards to the [SC-VTOL], this standard supports the achievement of compliance with the following requirements and/or complements the following related Means of Compliance:

- VTOL.2430 (c)
- VTOL.2430 (d)