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Polnjenje po kablu pri elektriļ nih vozilih - 2. del: Komunikacijski protokol med zunanjim polnilnikom in elektriļ nim vozilom

Conductive charging for electric vehicles - Part 2: Communication protocol between off-board charger and electric vehicle

Konduktive Ladung von Elektrofahrzeugen - Teil 2: Kommunikationsprotokoll zwischen externem Ladegerät und Elektrofahrzeug

Charge conductive pour véhicules électriques - Partie 2: Protocole de transmission entre le chargeur extérieur et le véhicule électrique

Ta slovenski standard je istoveten z: **CLC/TS 50457-2:2008**

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TECHNICAL SPECIFICATION

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CLC/TS 50457-2

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ICS 35.240.60; 43.120

Supersedes ENV 50275-2-4:1998

English version

Conductive charging for electric vehicles - Part 2: Communication protocol between off-board charger and electric vehicle

Charge conductive
pour véhicules électriques -
Partie 2: Protocole de transmission
entre le chargeur extérieur
et le véhicule électrique

Konduktive Ladung
von Elektrofahrzeugen -
Teil 2: Kommunikationsprotokoll zwischen
externem Ladegerät und Elektrofahrzeug

This Technical Specification was approved by CENELEC on 2007-03-01.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This Technical Specification was prepared by the CENELEC Reporting Secretariat 69, Electric road vehicles and electric industrial trucks.

The text of the draft was submitted to vote in accordance with the Internal Regulations, Part 2, Subclause 11.3.3.3 and was approved by CENELEC as CLC/TS 50457-2 on 2007-03-01.

This Technical Specification is to be used in conjunction with EN 61851-1.

This Technical Specification supersedes ENV 50275-2-4:1998.

In the framework of the conversion of ENV 50275-2-4, Clause 2 has been updated.

The following date was fixed:

– latest date by which the existence of the CLC/TS has to be announced at national level (doa) 2008-07-01

Contents

Introduction

This Technical Specification "Conductive charging for electric vehicles" is published in separate parts according to the following structure:

This Technical Specification covers the physical, electrical and performance requirements concerning devices for the charging system, when they are not already standardized.

Part 1: D.C. charging station.

Part 2: Communication protocol between off-board charger and electric vehicle.

1 Scope

This Technical Specification applies to the communication data link between external charger and electric road vehicle for the charging procedure, using the most common communication link.

This Part 2 applies to communication data link between the off-board charging system with direct current and electric road vehicles.

The aspects covered are the physical layer, the data link layer and the communication applicative layer.

This Technical Specification does not cover communication between dedicated off-board charger and their electric vehicle.

Annex A gives an example of normal operation.

2 Normative references

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

ISO 14229	Road vehicles - Diagnostic systems - Diagnostic services specifications
ISO 14230-1	Keyword Protocol 2000 – Part 1: Physical layer
ISO 14230-2	Keyword Protocol 2000 – Part 2: Data link layer
ISO 14230-3	Keyword Protocol 2000 – Part 3: Application layer

3 Definitions

For the purposes of this document, the following terms and definitions apply.

3.1
vehicle charging control unit (VCCU)
system embedded in the electric vehicle able to command and control the charging parameters of the off-board charger

3.2
charging parameters
parameters including set points needed by the off-board charger to generate a current adapted to the vehicle battery

3.3
charging values
values measured during charging process

4 Off-board charging system

4.1 General overview

Electric vehicles will be equipped with different technologies, voltage and charging current batteries.

In order to avoid any error during charging and to guarantee that the off-board charger will be able to charge all existing and future batteries, the charge shall be managed by the vehicle.

Any vehicle to be connected to a general purpose off-board charging system must include a charging control unit able to manage the charging process.

4.2 Charging process

The off-board charger shall be able to supply controlled DC voltage and/or current to the vehicle battery.

The charging values current and voltage shall be measured at least by the off-board charger.

If the vehicle charging control unit also makes this measurement, a full redundancy system could be established to achieve a high safety charging system.

- The charging parameters shall be established by the vehicle charging control unit and sent to off-board charger in order to be used as set points.
- The charging measured values will be sent by the off-board charger to the vehicle charging control unit.

4.3 Safety process

The start of the charging process shall be allowed by both the off-board charger and the vehicle charging control unit.

The charging process can be stopped at any time by the off-board charger or the vehicle charging control unit and shall be stopped in case of communication loss.

5 Communication interchange

5.1 Protocols basis

The standard data interchange is based on ISO 14230.

5.2 Adaptation for off-board charging application

The scope of ISO 14230 concerns requirements for diagnostic systems implemented on a serial data link layer, which allows a tester to control diagnostic functions in and on vehicle electronic control unit. The same protocol is used for the communication between an electric vehicle and an off-board charger for the charging procedure. After the initialization phase by the OBC, the VCCU shall control the charging process of the OBC. Contrarily to communication according to ISO 14230 where the server and the client are fixed during all the session, the roles are definitively reversed after the initialization phase.

5.3 Initialization header values

Initialization header values are those defined in ISO 14230-2 except for those specified hereafter.

5.3.1 Initialization mode

The initialization mode is 5 bauds only.

5.3.2 Address

The address sent to open the communication to the vehicle charging control unit shall be 66 h (functional address).

NOTE 66 h is the value 66 in hexadecimal code.

5.3.3 Key bytes

The key bytes are defined in accordance with ISO 14230-2 with for KB1:

AL0 = 1

AL1 = 0

HB0 = 1

HB1 = 0

TP0 = 1

TP1 = 0

That is to say the following two key bytes:

KB2	KB1	Hexadecimal code	Decimal code
10001111	11010101	8FD5	2005

KB2 is the most significative key byte.

The key bytes will define the state of the protocol; any change in the protocols for future use will change the key bytes.

5.4 Message structure

5.4.1 Message length

The maximum length for charging application shall be 16 bytes (included header and check-sums).

5.4.2 Message header values

The message header values shall be changed and defined as follows:

– number of header bytes: 1 as defined in 8.1.2.

6 Service definition

6.1 Basis

The services definition is based upon the draft of ISO 14229 with the following main differences:

- diagnostic is hereby replaced by data interchange;
- client (tester) is replaced by the vehicle charging control unit (VCCU);
- server (ECU) is replaced by the off-board charger (OBC);
- as there is only one server, no server identifier parameter shall be provided.

6.2 List of services used

Table 1 – List of services used

Services of ISO 14229 used for this application		**Generic services (client)**	**Generic services (server)**
Diagnostic management	TesterPresent	TestDevicePresent	
	StopDiagnosticSession	StopSession	
	Specific code		StopSessionRequest
Data transmission	ReadDataByLocalIdentifier	ChargerCharacteristics	
		ChargerIdentification	
	ReadDataByLocalIdentifier	VehicleIdentification	
Stored data transmission	ReadDiagnosticTrouble Codes	ReadDiagnosticTrouble Codes	
Input/Output Control	InputOutputControlByLocalIdentifier	SetSafetyLimits	
		SetpointAdjust	
		DisplayMessage	
		StartCharging	
		StopCharging	

6.3 Message interchange rules

After initialization, at any time the server is waiting for a request.

Any request sent by the client must be acknowledged by the server.

The server has the possibility to stop the session by using the generic *StopSessionRequest* answer.

7 Communication session

In this clause the generic messages to be sent are written in italics.

7.1 Phases

The communication sequence uses 7 main steps:

a) communication opening;

b) charger identification;

c) vehicle identification;

d) starting charging process;

e) charging process;

f) ending charging process;

g) closing communication.

The use of services, for each step, is detailed hereafter.

Table 2 – Use of services

	Communication Opening (a)	Charger identification (b)	Vehicle identification (c)	Safety limits (d1)	Starting charging process (d2)	Charging process (e)	Stopping charging process (f)	End of communication (g)
ChargerCharacteristics	M (b)	A	F	F	F	F	F	F
ChargerIdentification	F	A	F	F	F	F	F	F
VehicleIdentification	F	M (c)	A	F	F	F	F	F
ReadDiagnosticTroubleCodes	F	A	A	A	A	A	A	F
DisplayMessage	F	A	A	A	A	A	A	F
SetSafetyLimits	F	F	M (d1)	A	F	F	F	F
StartCharging	F	F	F	M (d2)	A	A	A (d2)	F
SetpointAdjust	F	F	F	F	M (e)	A	F	F
StopCharging	F	F	F	F	F	A (f)	A	F
StopSession	A (g)	A (g)	A (g)	A (g)	A (g)	A (g)	A (g)	F
StopSessionRequest	A	A	A	A	A	A	A	F
TestDevicePresent	A	A	A	A	A	A	A	F

A = Allowed,

A(x) = Allowed, go to step (x),

F = Forbidden,

M(x) = Mandatory, go to step (x).