

English Version

**Electric vehicle wireless power transfer (WPT) systems - Part 2:
Specific requirements for communication between electric road
vehicle (EV) and infrastructure
(IEC/TS 61980-2:2019)**

Systèmes de transfert de puissance sans fil (WPT) pour
véhicules électriques - Partie 2 : Exigences spécifiques en
matière de communication entre un véhicule électrique
routier et l'infrastructure
(IEC/TS 61980-2:2019)

Kontaktlose Energieübertragungssysteme (WPT) für
Elektrofahrzeuge - Teil 2: Besondere Anforderungen für die
Kommunikation zwischen Elektrostraßenfahrzeugen und
Infrastruktur
(IEC/TS 61980-2:2019)

This Technical Specification was approved by CENELEC on 2020-05-25.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

This document (CLC IEC/TS 61980-2:2020) consists of the text of IEC/TS 61980-2:2019 prepared by IEC/TC 69 "Electric road vehicles and electric industrial trucks".

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Technical Specification IEC/TS 61980-2:2019 was approved by CENELEC as a European Technical Specification without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60038:2009	NOTE	Harmonized as EN 60038:2011
ISO 15118-1	NOTE	Harmonized as EN ISO 15118-1
ISO 15118-5	NOTE	Harmonized as EN ISO 15118-5

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61980-1	-	Electric vehicle wireless power transfer (WPT) systems - Part 1: General requirements	-	-
IEC/TS 61980-3	2019	Electric vehicle wireless power transfer (wpt) systems - Part 3: Specific requirements for the magnetic field wireless power transfer systems	CLC IEC/TS 61980-3 2020	
ISO 15118	series	Road vehicles - Vehicle-to-grid communication Interface	EN ISO 15118	series
ISO 15118-2	-	Road vehicles - Vehicle-to-grid communication Interface - Part 2: Network and application protocol requirements	EN ISO 15118-2	-
ISO 15118-8	2018	Road vehicles - Vehicle to grid communication interface - Part 8: Physical layer and data link layer requirements for wireless communication	EN ISO 15118-8	2019
ISO 15118-20	-	Road vehicles - Vehicle to grid communication interface - Part 20: 2nd generation network and application protocol requirements	-	-

TECHNICAL SPECIFICATION



Electric vehicle wireless power transfer (WPT) systems – Part 2: Specific requirements for communication between electric road vehicle (EV) and infrastructure

CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references	10
3 Terms and definitions	11
4 Abbreviated terms	14
5 Communication of WPT systems	14
5.1 General.....	14
5.2 System architecture	14
5.3 General system requirements	16
5.3.1 General	16
5.3.2 Interoperability requirements	16
5.3.3 System configuration	16
5.3.4 Communication security.....	17
5.3.5 Timing	17
6 Power transfer process with respect to communication	17
6.1 General.....	17
6.2 Overview of operation process activities	17
6.3 Activities	18
6.3.1 Communication setup and service selection.....	18
6.3.2 Reject WPT session	18
6.3.3 Fine positioning	18
6.3.4 Pairing.....	19
6.3.5 Final compatibility check.....	19
6.3.6 Initial alignment check	20
6.3.7 Prepare power transfer	20
6.3.8 Time scheduled power transfer (informative)	21
6.3.9 Perform power transfer	22
6.3.10 Stop power transfer	23
6.3.11 WPT session	24
6.3.12 EV leaves WPT spot.....	24
6.3.13 Safety monitoring and diagnostics	24
6.3.14 Terminate communication.....	25
6.3.15 Terminate safety monitoring and diagnostics	25
6.3.16 Wake-up after power outage.....	25
7 Control process states.....	26
7.1 Supply device state definitions.....	26
7.1.1 Supply device state diagram.....	26
7.1.2 Stand by (WPT_S_SB)	27
7.1.3 Service initiated (WPT_S_SI).....	27
7.1.4 WPT session rejected	28
7.1.5 Awaiting alignment (WPT_S_AA)	29
7.1.6 Idle (WPT_S_IDLE)	31
7.1.7 Power transfer (WPT_S_PT).....	32
7.1.8 Service terminated occupied (WPT_S_STO).....	33
7.1.9 Out of service (WPT_S_OOS).....	34

7.1.10	Sleep mode WPT_S_SLP	34
7.2	Supply device state transitions	35
7.3	EV device state definitions	36
7.3.1	EV device state diagram	36
7.3.2	Stand by (WPT_V_SB)	37
7.3.3	Service initiated (WPT_V_SI).....	38
7.3.4	Awaiting alignment (WPT_V_AA).....	39
7.3.5	Idle (WPT_V_IDLE)	40
7.3.6	Power transfer active (WPT_V_PT)	40
7.3.7	Off (WPT_V_OFF)	40
7.4	EV state transitions.....	40
7.5	Exception handling.....	41
7.5.1	General	41
7.5.2	Supply device exception handling (WPT_S_ERR).....	41
7.5.3	EV device exception handling (WPT_V_ERR).....	41
7.5.4	Exception descriptions.....	42
8	Communication parameter for WPT systems	42
8.1	General.....	42
8.2	General parameters	42
8.3	Communication setup	42
8.4	Service selection	43
8.5	Fine positioning	45
8.5.1	General	45
8.5.2	Starting fine positioning	45
8.5.3	Fine positioning data exchange	45
8.5.4	Terminating fine positioning.....	46
8.6	Pairing	46
8.6.1	General	46
8.6.2	Start pairing.....	46
8.7	Initial alignment check	47
8.7.1	General	47
8.7.2	Initial alignment check request/response	47
8.8	Prepare power transfer	48
8.8.1	General	48
8.8.2	Final compatibility check.....	48
8.9	Perform power transfer	49
8.10	Stop power transfer	50
8.11	Terminate communication	50
8.12	Exception handling.....	50
9	Message sequences of communication with WLAN.....	51
9.1	General.....	51
9.2	Messages of communication for power transfer.....	51
9.3	Communication setup	51
9.4	Service selection	51
9.5	Fine positioning	52
9.6	Pairing	52
9.7	Final compatibility check	52
9.8	Initial alignment check	52
9.9	Prepare power transfer	53

9.10	Perform power transfer	53
9.11	Stop power transfer	54
9.12	Terminate communication	54
Annex A	(informative) Use cases	55
A.1	General.....	55
A.2	Use case descriptions	57
A.2.1	UC select supply device	57
A.2.2	UC service selection	59
A.2.3	UC fine positioning	60
A.2.4	UC prepare power transfer	62
A.2.5	UC safety monitoring and diagnostics	64
A.2.6	UC perform power transfer	64
A.2.7	UC stop power transfer	65
A.2.8	UC sleep mode (optional)	67
Annex B	(informative) Physical definition of links and signals.....	69
B.1	General.....	69
B.2	System architecture	69
B.3	WLAN	69
B.4	SR signal	69
B.5	LF signal (EV device to supply device).....	70
B.6	Magnetic vector (EV device to supply device)	72
B.7	LPE (supply device to EV device)	72
Annex C	(informative) Usage of supplemental signals.....	73
C.1	General.....	73
C.2	Fine positioning	73
C.2.1	General	73
C.2.2	Manual	73
C.2.3	Low power excitation (LPE)	73
C.2.4	LF signal	74
C.2.5	Magnetic vector	77
C.3	Pairing	77
C.3.1	General	77
C.3.2	Coding pattern specification.....	77
C.3.3	Low power excitation (LPE)	78
C.3.4	SR signal.....	79
C.3.5	LF signal	79
C.3.6	Magnetic vector	79
C.4	Initial alignment check	80
C.4.1	General	80
C.4.2	LPE target current check	80
C.4.3	RSSI method	81
C.5	Continuous alignment check	82
C.5.1	General	82
C.5.2	System anomaly check	82
C.5.3	SR signal.....	83
C.6	Emergency shutdown.....	83
C.6.1	General	83
C.6.2	RF signal.....	83
C.6.3	Power termination.....	83

Bibliography.....	84
Figure 1 – Possible elements of combination in a communication subsystem.....	15
Figure 2 – WPT site with a single supply device.....	16
Figure 3 – Operation process of activities for the WPT.....	17
Figure 4 – Supply device state diagram	26
Figure 5 – Activity communication setup	27
Figure 6 – Activity service selection	28
Figure 7 – Activity reject WPT session.....	29
Figure 8 – Activity from fine positioning to initial alignment check	30
Figure 9 – Activity prepare power transfer.....	31
Figure 10 – Activity terminate WPT session	32
Figure 11 – Activity Sleep	32
Figure 12 – Activity stop power transfer	33
Figure 13 – Activity EV leave WPT spot.....	34
Figure 14 – Activity wake-up.....	35
Figure 15 – EV device state diagram	37
Figure 16 – Activity communication setup (EV device state).....	38
Figure 17 – Activity service selection (EV device state).....	38
Figure 18 – Activity from fine positioning to initial alignment check (EV device state).....	39
Figure 19 – Activity prepare power transfer (EV device state)	40
Figure A.1 – Use cases particularly for wireless power transfer.....	55
Figure A.2 – Use cases from ISO 15118-1 reusable for WPT systems.....	56
Figure A.3 – Activity diagram for UC select supply device.....	58
Figure A.4 – Activity diagram for UC fine positioning.....	61
Figure A.5 – Activity diagram for UC prepare power transfer	63
Figure A.6 – Activity diagram for UC perform power transfer	65
Figure A.7 – Activity diagram for UC stop power transfer	66
Figure A.8 – Activity diagram for UC sleep mode	68
Figure B.1 – Example arrangement of the auxiliary LF antennas for the primary device (left) and the vehicle (right).....	71
Figure B.2 – Example arrangement of the auxiliary LF antennas for the primary device (left) and the EV (right)	72
Figure C.1 – Explanation of parameters for LF fine positioning	76
Figure C.2 – Coding pattern timing and examples	78
Figure C.3 – Symmetrical antenna configuration for signal comparison with zero offset	81
Figure C.4 – Symmetrical antenna configuration for signal comparison with given offset.....	82
Table 1 – Supply device state transitions	35
Table 2 – EV device state transitions	41
Table 3 – Exception handling.....	42
Table 4 – Service selection EVCC request parameters	43
Table 5 – Service selection SECC response parameters.....	43
Table 6 – Method list for fine positioning.....	44

Table 7 – Method list for pairing.....	45
Table 8 – Method list for initial alignment.....	45
Table 9 – Fine positioning response.....	45
Table 10 – Pairing start request.....	46
Table 11 – Pairing start response.....	46
Table 12 – Pairing confirmation request.....	47
Table 13 – Pairing confirmation response.....	47
Table 14 – Initial alignment check request.....	47
Table 15 – Initial alignment check response.....	47
Table 16 – Final compatibility check request parameters.....	48
Table 17 – Final compatibility check response parameters.....	48
Table 18 – Perform power transfer request parameters.....	49
Table 19 – Perform power transfer response parameters.....	49
Table 20 – Error request parameters.....	50
Table 21 – Error respond parameters.....	50
Table A.1 – UC select supply device.....	57
Table A.2 – UC service selection.....	59
Table A.3 – UC fine positioning.....	60
Table A.4 – UC prepare power transfer.....	62
Table A.5 – UC safety monitoring and diagnostics.....	64
Table A.6 – UC perform power transfer.....	64
Table A.7 – UC stop power transfer.....	65
Table A.8 – UC sleep mode.....	67
Table C.1 – Data of the antenna arrangement at EV to send to SECC.....	74
Table C.2 – Data of the antenna arrangement at primary device to send to EVCC.....	75
Table C.3 – Data exchanged between EVCC and SECC during fine positioning.....	76