ISO 17409:2020-02 (E)

Electrically propelled road vehicles - Conductive power transfer - Safety requirements

Contents

Page

Foreword v

1 Scope 1

2 Normative references 1

3 Termsanddefinitions 2

4 Environmental and operational conditions 10

5 Specificrequirementsforthevehicleinlet,plug,andcable 11
5.1 Requirements for the plug and cable (case A) 11
5.2 Requirements for the vehicle inlet 11

6 Requirementsforprotectionofpersonsagainstelectricshock 11
6.1 General 11
6.2 Basic protection when connected to an external electric circuit 11
6.3 Protective conductor 12
6.4 Isolation resistance 13
6.4.1 AC connection 13
6.4.2 DC connection 13
6.5 Requirements for unmated vehicle contacts 13
6.5.1 General 13
6.5.2 Normal operation 14
6.5.3 Operation under single fault conditions 14
6.6 Insulation coordination 15
6.6.1 AC connection 15
6.6.2 DC connection 15
6.7 Touch current 16
6.8 Compatibility with residual current devices (RCD) 16

7 Protectionagainstthermalincident 16
7.1 Requirements for normal operation 16
7.2 Overcurrent protection 16
7.2.1 General 16
7.2.2 Overload protection 17
7.2.3 Short-circuit protection for AC connection 17
7.2.4 Short-circuit protection for DC connection 17
7.3 Arc protection for DC connections 18
7.4 Residual energy after disconnection 19
7.5 Transient overvoltage 19

8 Additional requirements for AC power transfer 19
8.1 Voltage and frequency ranges for normal operation 19
8.2 Current characteristics 19
8.2.1 Load current 19
8.2.2 Inrush current 20
8.3 Active factor 20
8.4 Interlock function for the vehicle coupler 21
8.5 Phase order in three-phase operation 21

9 Additional requirements for DC power transfer 21
9.1 General 21
9.2 Disconnection device 21
9.3 Control pilot functions 22
9.4 Vehicle isolation resistance monitoring system 22
9.5 Locking of the vehicle connector 22
9.6 AC or DC electric power at the same contacts 22
9.7 Contact temperature 23
9.8 Overvoltage in case of a load dump 24

9.9 Compatibility with insulation monitoring 24

10 Reverse power transfer 24
10.1 General 24
10.2 AC reverse power transfer 25
10.2.1 General 25
10.2.2 Output power quality 25
10.2.3 Prevention of disconnection of vehicle coupler under load 26
10.2.4 Protection against electrical shock 26
10.2.5 Protection against thermal incident 26
10.3 DC reverse power transfer 26
10.3.1 General 26
10.3.2 Connection to the external electric circuit 27
10.3.3 Protection against overdischarge of the RESS 27
10.3.4 Auxiliary power supply from EV (optional) 27
10.3.5 Protection against thermal incident 27

11 Operational requirements 27

12 Owner'smanualandmarking 27
12.1 Owner's manual 27
12.2 Marking 27

13 Test procedure 27
13.1 General 27
13.2 Resistance of protective conductor 28
13.3 Isolation resistance test 28
13.4 Withstand voltage test 28
13.4.1 General 28
13.4.2 Test voltage 29
13.5 Inrush current tests 29
13.5.1 General 29
13.5.2 Measurement 30
13.6 Touch current 30
13.6.1 General 30
13.6.2 AC Charging 31
13.6.3 DC charging 33
13.7 DC power transfer with maximum current 34
13.8 DC power contact over temperature 34

Annex A (informative) Y capacitance measurement 37

Bibliography 40