

SLOVENSKI STANDARD
SIST EN 61881-3:2012/A1:2014
01-januar-2014

Železniške naprave - Oprema voznih sredstev - Kondenzatorji za močnostno elektroniko - 3. del: Električni dvoplastni kondenzatorji - Dopolnilo A1 (IEC 61881-3:2012/A1:2013)

Railway applications - Rolling stock equipment - Capacitors for power electronics - Part 3: Electric double-layer capacitors

Bahnanwendungen - Betriebsmittel auf Bahnfahrzeugen - Kondensatoren für Leistungselektronik - Teil 3: Doppelschichtkondensatoren

Applications ferroviaires - Matériel roulant - Condensateurs pour électronique de puissance - Partie 3: Condensateurs électriques à double couche

Ta slovenski standard je istoveten z: EN 61881-3:2012/A1:2013

ICS:

31.060.70	Močnostni kondenzatorji	Power capacitors
45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering

SIST EN 61881-3:2012/A1:2014 **en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61881-3/A1

November 2013

ICS 45.060

English version

**Railway applications -
Rolling stock equipment -
Capacitors for power electronics -
Part 3: Electric double-layer capacitors
(IEC 61881-3:2012/A1:2013)**

Applications ferroviaires -
Matériel roulant -
Condensateurs pour électronique
de puissance -
Partie 3: Condensateurs électriques
à double couche
(CEI 61881-3:2012/A1:2013)

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This amendment A1 modifies the European Standard EN 61881-3:2012; it was approved by CENELEC on 2013-10-21. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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CENELEC

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 9/1819/FDIS, future IEC 61881-3:2012/A1, prepared by IEC/TC 9 "Electrical equipment and systems for railways" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61881-3:2012/A1:2013.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-07-21
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-10-21

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

Endorsement notice

The text of the International Standard IEC 61881-3:2012/A1:2013 was approved by CENELEC as a European Standard without any modification.

In the Bibliography of EN 61881-3:2012, the following note has to be added for the standard indicated:

IEC 60529 NOTE Harmonized as EN 60529.

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Edition 1.0 2013-09

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

**Railway applications – Rolling stock equipment – Capacitors for power electronics –
Part 3: Electric double-layer capacitors**

**Applications ferroviaires – Matériel roulant – Condensateurs pour électronique de puissance –
Partie 3: Condensateurs électriques à double couche**

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FOREWORD

This amendment has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

The text of this amendment is based on the following documents:

FDIS	Report on voting
9/1819/FDIS	9/1843/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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Replace the title of 5.7 by the following:

5.7 Short-circuit test

3 Terms and definitions

Delete definition 3.19.

Definition 3.21

Replace definition 3.21 by the following new definition:

3.21

maximum operating temperature (T_{\max})

highest temperature of the case at which the capacitor cell may be operated

Note 1 to entry: The operating temperature is different from upper category temperature.

Table 1 – Classification of tests**No. 5 Surge discharge test**

Replace: Surge discharge test *by:* Short-circuit test

5.7 Surge discharge test (under consideration)

Replace subclause 5.7 by the following:

5.7 Short-circuit test**5.7.1 General**

Unless otherwise specified, the short-circuit test for the capacitor cell shall be carried out by the following procedure.

5.7.2 Preconditioning

The capacitor shall be treated according to 5.1.4 and 5.1.5.

5.7.3 Initial measurement

The capacitance and internal resistance of the capacitor shall be measured in accordance with 5.3.

5.7.4 Test method

The capacitor shall be charged by means of a d.c. source up to U_R within 5 min and be held for 5 min then short-circuited through appropriate discharge circuit. The test shall be repeated 5 times. The test should be repeated after the capacitor temperature reaches thermal equilibrium with surrounding temperature.

The resistance of the discharge circuit (cables, switches, shunts or electronic) shall be equal to or less than the internal resistance of the capacitor or 1 m Ω , whichever is lower. Capacitor cells can be connected in series for this test.

5.7.5 Post treatment

The capacitor shall be treated according to 5.1.5 and discharged through the suitable discharge device.

5.7.6 Final measurement

The capacitance and internal resistance of the capacitor shall be measured in accordance with 5.3.

5.7.7 Acceptance criteria

The capacitance change and internal resistance change shall be within the values as agreed between the manufacturer and the purchaser.

No visible damage and no electrolyte leakage shall be observed.

5.11 Endurance cycling test

Replace subclause 5.11 by the following:

5.11 Endurance cycling test

5.11.1 General

Unless otherwise specified, the endurance cycling test for the capacitor shall be carried out by the following procedure. For capacitor module or bank, this test may be substituted by capacitor cell test, when agreed between the manufacturer and the purchaser.

NOTE The purpose of the endurance cycling test is to demonstrate the performance of the capacitor under the conditions which will actually occur in service.

5.11.2 Preconditioning

The capacitor shall be treated according to 5.1.4 and 5.1.5.

5.11.3 Initial measurements

The capacitance and internal resistance of the capacitor shall be measured in accordance with 5.3.

5.11.4 Test method

5.11.4.1 Test temperature

Test temperature shall be 10 °C lower than the maximum operating temperature specified by the manufacturer.

Test temperature shall be measured at the capacitor cell case for capacitor cell and at the hottest cell in the module or bank for capacitor module or bank.

5.11.4.2 Apparatus

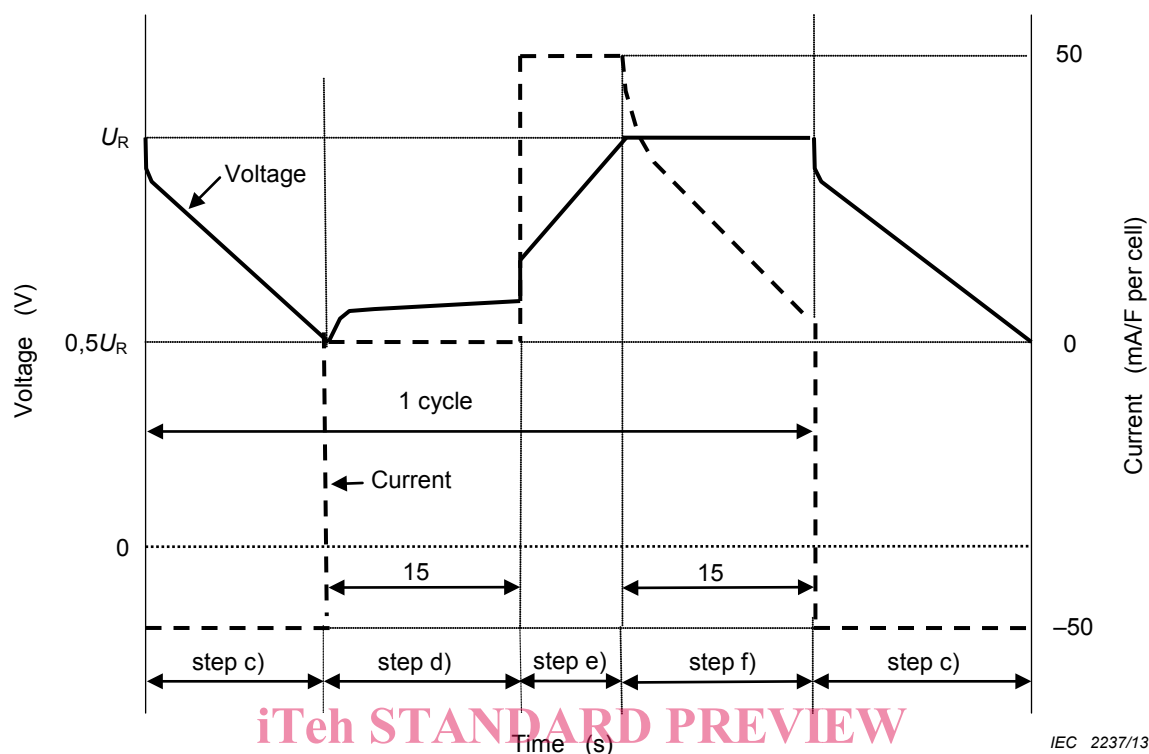
The charge and discharge device shall be capable of charging and discharging the capacitor with the constant current as specified in 5.11.4.3.

At the charge and discharge cycles, monitoring the voltage-time curves of the all capacitor cells within the test set-up should be carried out.

5.11.4.3 Test steps

Unless otherwise specified, the test shall consist of the following steps, repeating c) through f) continuously (see Figure 3) until the end of test criteria is reached:

- a) charge up to U_R with constant current of 5 mA/F per cell;
- b) continue charging at U_R for 30 min;
- c) discharge down to $0,5U_R$ with constant current of 50 mA/F per cell;
- d) pause for 15 s without charging current;
- e) charge up to U_R with constant current of 50 mA/F per cell;
- f) hold for 15 s at constant voltage U_R .



NOTE Current curve in step f) is not the specified value, but shows the result of constant voltage applied.

Figure 3 – Endurance cycling test steps

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5.11.4.4 Test

The capacitor shall be connected to the charge and discharge device, then start test steps as specified in 5.11.4.3. When the capacitor cell case has reached the test temperature, the cooling/heating conditions are constantly adjusted throughout the test so that the capacitor cell or the temperature of the hottest cell in a module or bank stays fixed at the test temperature.

The capacitance and internal resistance of the capacitor can be obtained while the test step (cycling) is in operation by monitoring voltage-time curves and analysing them. The initial capacitance and internal resistance during cycling shall be taken after the capacitor has reached the thermal equilibrium.

NOTE The capacitance and internal resistance measurements during cycling might differ from the initial measurement as specified in 5.11.3 and final measurement as specified in 5.11.7 due to a different measurement current.

5.11.5 End of test criteria

The test is finished for a capacitor cell when the measured value during cycling reaches one of the following criteria:

- capacitance reaches 70 % of its initial value or;
- internal resistance reaches 200 % of its initial value;
- for a module or bank the end of life is reached when the first cell reaches the end of life criteria of a cell.

The test may be finished before the specified end of test criteria are achieved depending upon the agreement between manufacturer and purchaser.