
**Močnostna elektronika za elektroenergetske prenosne in distribucijske
sisteme – Preskušanje tiristorskih ventilov (elektronk) za statične
kompensatorje jalove moči – Dopolnilo A1 (IEC 61954:1999/A1:2003)**

Power electronics for electrical transmission and distribution systems - Testing of
thyristor valves for static VAR compensators - Amendment A1 (IEC
61954:1999/A1:2003)

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EUROPEAN STANDARD

EN 61954/A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2003

ICS 29.200; 31.080.01

English version

**Power electronics for electrical transmission and distribution systems -
Testing of thyristor valves for static VAR compensators
(IEC 61954:1999/A1:2003)**

Electronique de puissance
pour les réseaux électriques de transport
et de distribution –
Essais des valves à thyristors
pour les compensateurs statiques
d'énergie réactive
(CEI 61954:1999/A1:2003)

Leistungselektronik für Übertragungs-
und Verteilungsnetze –
Prüfung von Thyristorventilen
für statische Blindleistungskompensatoren
(IEC 61954:1999/A1:2003)

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This amendment A1 modifies the European Standard EN 61954:1999; it was approved by CENELEC on 2003-04-01. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This amendment exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 22F/82/FDIS, future amendment 1 to IEC 61954:1999, prepared by SC 22F, Power electronics for electrical transmission and distribution systems, of IEC TC 22, Power electronic systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61954:1999 on 2003-04-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2004-01-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2006-04-01

Endorsement notice

The text of amendment 1:2003 to the International Standard IEC 61954:1999 was approved by CENELEC as an amendment to the European Standard without any modification.

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NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC
61954

1999

AMENDEMENT 1
AMENDMENT 1
2003-02

Amendement 1

**Electronique de puissance pour les réseaux
électriques de transport et de distribution –
Essais des valves à thyristors pour les
compensateurs statiques d'énergie réactive**

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Amendment 1

**Power electronics for electrical transmission
and distribution systems –
Testing of thyristor valves for static var
compensators**

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Международная Электротехническая Комиссия

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For price, see current catalogue*

FOREWORD

This amendment has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronics systems and equipment.

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

FDIS	Report on voting
22F/82/FDIS	22F/86/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 the base publication and its amendments will remain unchanged until 2007. At this date, the publication will be

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

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Page 9

3 Definitions

[SIST EN 61954:2002/A1:2004](https://standards.iteh.ai/catalog/standards/sist/be64a7b6-7998-4218-b3fb-065c697b1543/sist-en-61954-2002-a1-2004)

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3.1

thyristor level

Replace, on page 11, definition 3.1 by the following new definition:

part of a thyristor valve comprising a thyristor, or thyristors connected in parallel or anti-parallel, together with their immediate auxiliaries and reactor, if any

3.4

valve section

Replace, on page 11, definition 3.4 by the following new definition:

electrical assembly, comprising a number of thyristors and other components, which exhibits pro-rated electrical properties of a complete thyristor valve but only a portion of the full voltage blocking capability of the thyristor valve, and that can be used for tests

3.7

valve base electronics (VBE)

Replace, on page 11, definition 3.7 by the following new definition:

electronic unit, at earth potential, which is the interface between the control system of the SVC and the thyristor valves

3.9

redundant thyristor levels

Replace, on page 11, definition 3.9 by the following new definition:

the maximum number of thyristor levels in the thyristor valve that may be short-circuited, externally or internally, during service without affecting the safe operation of the thyristor valve as demonstrated by type tests; and which if and when exceeded, would require either the shutdown of the thyristor valve to replace the failed thyristors, or the acceptance of increased risk of failures

Page 13

4 General requirements for type and optional tests

Replace the title of this clause by the following:

4 General requirement for type, production and optional tests

Page 13

4.1 Summary of tests

Delete, in the first sentence, the word "type".

Page 13

Table 1 – List of type tests and optional tests

Replace the title of Table 1 by the following:

Table 1 – List of tests

Page 19

4.4.1.2 Operational tests

Replace the text of the first paragraph by the following text:

Where possible, a complete thyristor valve should be tested. Otherwise the tests may be performed on thyristor valve sections. The choice depends mainly upon the thyristor valve design and the test facilities available. Where tests on the thyristor valve sections are proposed, the tests specified in this standard are valid for thyristor valve sections containing five or more series-connected thyristor levels. If tests on thyristor valve sections with fewer than five thyristor levels are proposed, additional test safety factors shall be agreed upon. Under no circumstances shall the number of series-connected thyristor levels in a thyristor valve section be less than three.

Page 21

4.4.3.2 Operational tests

Replace the text of this Subclause by the following text:

For operational tests, redundant thyristor levels should not be short-circuited. The test voltages and circuit impedances used shall be adjusted by means of a scaling factor k_n .

$$k_n = \frac{N_{\text{tot}}}{N_t - N_r}$$

where

N_{tot} is the total number of series thyristor levels in the test object;

N_t is the total number of series thyristor levels in the valve;

N_r is the total number of redundant series thyristor levels in the valve.

NOTE In thyristor valves with a small number of thyristor levels, where the redundancy is a significant portion of the total, this may cause certain valve components to be overstressed. As an alternative, it is therefore acceptable to perform the operational test with redundant thyristor levels short-circuited and without scaling the test voltages and impedances by k_n .

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4.5 Permissible component failures during type testing

Replace the second sentence of the third paragraph by the following:

[SIST EN 61954:2002/A1:2004](https://standards.iteh.ai/catalog/standards/sist/en-61954-2002/a1-2004)

If, following a type test, one thyristor level has become short-circuited, then the failed level shall be restored and this type test repeated (see 4.4.1, b) in IEC 60700-1, Amendment 1).

Page 25

5.1.1.3 Test procedures

Delete the last sentence of item f).

Page 27

5.2.1.3 Test procedures

Delete the last sentence of item f).

Page 31

5.3.1.3 Test procedures

Delete, on page 33, the last sentence of item f).

Page 33

5.3.2.2 Test values and waveshapes

Add, on page 35 at the end of item b), the following text:

The test shall be repeated with the valve electronics initially de-energized.

NOTE In valve designs where the regular firing circuits are energized independently of the main power circuit, this additional test is not applicable.

Page 41

5.4.3.2 Test procedures

Add, before the note, the following paragraph:

In order to verify the current conduction capacity of the interconnection links (bus-bars) between the antiparallel thyristors, the test shall be repeated with one thyristor level short-circuited (for example by substituting a thyristor by a metal dummy).

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6.1.1.2 Test values and waveshapes

Replace, on page 43 item b), the words "b) Test voltage U_{ts2} , 30 min" by the words "b) Test voltage U_{ts2} , 3 h".

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Page 43

6.1.1.3 Test procedures

Replace, on page 43 item d), the words "for 30 min" by the words "for 3 hours".

Delete, on page 45, the last sentence of item f).

Add, on page 45 after the note, the following text:

Before repeating the test with opposite polarity, the valve terminals may be short-circuited together and earthed for several hours to discharge the DC polarization of the dielectric materials within the valve. The same procedure should be repeated at the end of the DC voltage test.

Page 45

6.1.1.4 Alternative test procedures

Delete the last sentence of item a) 6)