

© Copyright SEK Svensk Elstandard. Reproduction in any form without permission is prohibited.

REDLINE VERSION

Kraftelektronik – Provning av ventiler för statiska kompensatorer (SVC)

*Static VAR compensators (SVC) –
Testing of thyristor valves*

En så kallad ”Redline version” (RLV) innehåller både den fastställda IEC-standardens och en ändringsmarkerad standard. Alla tillägg och borttagningar sedan den tidigare utgåvan är markerade med färg. Med en RLV sparar du mycket tid när du ska identifiera och bedöma aktuella ändringar i standarden. SEK Svensk Elstandard kan bara ge ut en RLV i de fall den finns tillgänglig från IEC.



IEC 61954

Edition 3.0 2021-10
REDLINE VERSION

INTERNATIONAL STANDARD



Static VAR compensators (SVC) – Testing of thyristor valves

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.240.99; 31.080.20

ISBN 978-2-8322-1036-3

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	7
4 General requirements for type, production and optional tests.....	9
4.1 Summary of tests	9
4.2 Objectives of tests.....	10
4.2.1 General	10
4.2.2 Dielectric tests	10
4.2.3 Operational tests.....	10
4.2.4 Electromagnetic interference tests.....	11
4.2.5 Production tests	11
4.2.6 Optional tests.....	11
4.3 Guidelines for the performance of type and optional tests	11
4.4 Test conditions.....	12
4.4.1 General	12
4.4.2 Valve temperature at testing.....	13
4.4.3 Redundant thyristor levels.....	14
4.5 Permissible component failures during type testing	14
4.6 Documentation of test results	14
4.6.1 Test reports to be issued.....	14
4.6.2 Contents of a type test report	15
5 Type tests on TCR and TSR valves.....	16
5.1 Dielectric tests between valve terminals and earth	16
5.1.1 General	16
5.1.2 AC test	16
5.1.3 Lightning impulse test	17
5.2 Dielectric tests between valves (MVU only).....	17
5.2.1 General	17
5.2.2 AC test	17
5.2.3 Lightning impulse test	18
5.3 Dielectric tests between valve terminals.....	18
5.3.1 General	18
5.3.2 AC test	18
5.3.3 Switching impulse test.....	20
5.4 Operational tests.....	21
5.4.1 Periodic firing and extinction test.....	21
5.4.2 Minimum AC voltage test.....	23
5.4.3 Temperature rise test.....	23
6 Type tests on TSC valves	24
6.1 Dielectric tests between valve terminals and earth	24
6.1.1 General	24
6.1.2 AC-DC test	24
6.1.3 Lightning impulse test	26
6.2 Dielectric tests between valves (for MVU only).....	27
6.2.1 General	27

6.2.2	AC-DC test	27
6.2.3	Lightning impulse test	29
6.3	Dielectric tests between valve terminals.....	30
6.3.1	General	30
6.3.2	AC-DC test	30
6.3.3	Switching impulse test.....	33
6.4	Operational tests.....	34
6.4.1	Overcurrent tests	34
6.4.2	Minimum AC voltage test.....	37
6.4.3	Temperature rise test.....	38
7	Electromagnetic interference tests	38
7.1	Objectives.....	38
7.2	Test procedures	38
7.2.1	General	38
7.2.2	Switching impulse test.....	39
7.2.3	Non-periodic firing test.....	39
8	Production tests.....	39
8.1	General.....	39
8.2	Visual inspection	39
8.3	Connection check.....	39
8.4	Voltage-dividing/damping circuit check	40
8.5	Voltage withstand check.....	40
8.6	Check of auxiliaries	40
8.7	Firing check	40
8.8	Cooling system pressure test.....	40
8.9	Partial discharge tests.....	40
9	Optional tests on TCR and TSR valves.....	40
9.1	Overcurrent test	40
9.1.1	Overcurrent with subsequent blocking	40
9.1.2	Overcurrent without blocking	41
9.2	Positive voltage transient during recovery test	41
9.2.1	Objectives.....	41
9.2.2	Test values and waveshapes.....	41
9.2.3	Test procedures	42
9.3	Non-periodic firing test	42
9.3.1	Objectives.....	42
9.3.2	Test values and waveshapes.....	42
9.3.3	Test procedures	43
10	Optional tests on TSC valves	44
10.1	Positive voltage transient during recovery test	44
10.1.1	Test objective	44
10.1.2	Test values and waveshapes.....	44
10.1.3	Test procedures	44
10.2	Non-periodic firing test	44
10.2.1	Objectives.....	44
10.2.2	Test values and waveshapes.....	45
10.2.3	Test procedures	46

Figure 1 – TSC branch.....	35
Figure 2 – One-loop overcurrent.....	36
Figure 3 – Two-loop overcurrent.....	37
Table 1 – List of tests	9
Table 2 – Number of thyristor levels permitted to fail during type tests	15

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**STATIC VAR COMPENSATORS (SVC) –
TESTING OF THYRISTOR VALVES****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61954:2011+AMD1:2013+AMD2:2017 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 61954 has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronic systems and equipment.

This third edition cancels and replaces the second edition published in 2011, Amendment 1:2013 and Amendment 2:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition: important clarifications were made in 4.4.1.2, 5.1.2.2, 5.1.3.2, 5.2.3.2, 6.1.2.2, 6.1.2.4, 6.1.3.2, 6.2.2.2, 6.2.2.4, 6.3.2.2 and 9.3.2.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
22F/642/FDIS	22F/658/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

STATIC VAR COMPENSATORS (SVC) – TESTING OF THYRISTOR VALVES

1 Scope

This document defines type, production and optional tests on thyristor valves used in thyristor controlled reactors (TCR), thyristor switched reactors (TSR) and thyristor switched capacitors (TSC) forming part of static VAR compensators (SVC) for power system applications. The requirements of the document apply both to single valve units (one phase) and to multiple valve units (several phases).

Clauses 4 to 7 detail the type tests, i.e. tests which are carried out to verify that the valve design meets the requirements specified. Clause 8 covers the production tests, i.e. tests which are carried out to verify proper manufacturing. Clauses 9 and 10 detail optional tests, i.e. tests additional to the type and production tests.

2 Normative references

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.

IEC 60060 (all parts), *High-voltage test techniques*

IEC 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60060-2, *High-voltage test techniques – Part 2: Measuring systems*

IEC 60071 (all parts), *Insulation co-ordination*

IEC 60071-1:2006/2019, *Insulation co-ordination – Part 1: Definitions, principles and rules*
~~IEC 60071-1:2006/AMD1:2010~~

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

IEC 60700-1:2015, *Thyristor valves for high-voltage direct current (HVDC) power transmission – Part 1: Electrical testing*

© Copyright SEK Svensk Elstandard. Reproduction in any form without permission is prohibited.

Kraftelektronik – Provning av ventiler för statiska kompensatorer (SVC)

*Static VAR compensators (SVC) –
Testing of thyristor valves*

Som svensk standard gäller europastandarden EN IEC 61954:2021. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 61954:2021.

Nationellt förord

Europastandarden EN IEC 61954:2021

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61954, Third edition, 2021 - Static VAR compensators (SVC) - Testing of thyristor valves**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 61954, utgåva 2, 2011 med ändringarna SS-EN 61954/A1:2013 och SS-EN 61954/A2:2017, gäller ej fr o m 2024-11-08.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

English Version

Static VAR compensators (SVC) - Testing of thyristor valves
(IEC 61954:2021)

Compensateurs statiques de puissance réactive (SVC) -
Essais des valves à thyristors
(IEC 61954:2021)

Statische Blindleistungskompensatoren (SVC) - Prüfung
von Thyristorventilen
(IEC 61954:2021)

This European Standard was approved by CENELEC on 2021-11-08. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard 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 CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard 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 CEN-CENELEC Management Centre has the same status as the official versions.

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

The text of document 22F/642/FDIS, future edition 3 of IEC 61954, 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 approved by CENELEC as EN IEC 61954:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2022-08-08 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2024-11-08 document have to be withdrawn

This document supersedes EN 61954:2011 and all of its amendments and corrigenda (if any).

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.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61954:2021 was approved by CENELEC as a European Standard without any modification.

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 Where 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 60060	series	High-voltage test techniques	EN 60060	series
IEC 60060-1	2010	High-voltage test techniques - Part 1: General definitions and test requirements	EN 60060-1	2010
IEC 60060-2	-	High-voltage test techniques - Part 2: Measuring systems	EN 60060-2	-
IEC 60071	series	Insulation co-ordination	EN IEC 60071	series
IEC 60071-1	2019	Insulation co-ordination - Part 1: Definitions, principles and rules	EN IEC 60071-1	2019
IEC 60270	-	High-voltage test techniques - Partial discharge measurements	EN 60270	-
IEC 60700-1	2015	Thyristor valves for high voltage direct current (HVDC) power transmission - Part 1: Electrical testing	EN 60700-1	2015

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Static VAR compensators (SVC) – Testing of thyristor valves

Compensateurs statiques de puissance réactive (SVC) – Essais des valves à thyristors

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.240.99; 31.080.20

ISBN 978-2-8322-1033-1

<p>Warning! Make sure that you obtained this publication from an authorized distributor.</p> <p>Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.</p>
--

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	7
4 General requirements for type, production and optional tests.....	9
4.1 Summary of tests	9
4.2 Objectives of tests.....	10
4.2.1 General	10
4.2.2 Dielectric tests	10
4.2.3 Operational tests.....	10
4.2.4 Electromagnetic interference tests.....	11
4.2.5 Production tests	11
4.2.6 Optional tests.....	11
4.3 Guidelines for the performance of type and optional tests	11
4.4 Test conditions.....	12
4.4.1 General	12
4.4.2 Valve temperature at testing.....	13
4.4.3 Redundant thyristor levels.....	13
4.5 Permissible component failures during type testing	14
4.6 Documentation of test results	14
4.6.1 Test reports to be issued.....	14
4.6.2 Contents of a type test report	15
5 Type tests on TCR and TSR valves.....	15
5.1 Dielectric tests between valve terminals and earth	15
5.1.1 General	15
5.1.2 AC test	16
5.1.3 Lightning impulse test	16
5.2 Dielectric tests between valves (MVU only).....	17
5.2.1 General	17
5.2.2 AC test	17
5.2.3 Lightning impulse test	18
5.3 Dielectric tests between valve terminals.....	18
5.3.1 General	18
5.3.2 AC test	18
5.3.3 Switching impulse test.....	20
5.4 Operational tests.....	21
5.4.1 Periodic firing and extinction test.....	21
5.4.2 Minimum AC voltage test.....	22
5.4.3 Temperature rise test.....	23
6 Type tests on TSC valves	23
6.1 Dielectric tests between valve terminals and earth	23
6.1.1 General	23
6.1.2 AC-DC test	24
6.1.3 Lightning impulse test	25
6.2 Dielectric tests between valves (for MVU only).....	26
6.2.1 General	26

6.2.2	AC-DC test	26
6.2.3	Lightning impulse test	28
6.3	Dielectric tests between valve terminals.....	28
6.3.1	General	28
6.3.2	AC-DC test	28
6.3.3	Switching impulse test.....	30
6.4	Operational tests.....	31
6.4.1	Overcurrent tests	31
6.4.2	Minimum AC voltage test.....	35
6.4.3	Temperature rise test.....	36
7	Electromagnetic interference tests	36
7.1	Objectives.....	36
7.2	Test procedures	36
7.2.1	General	36
7.2.2	Switching impulse test.....	37
7.2.3	Non-periodic firing test.....	37
8	Production tests.....	37
8.1	General.....	37
8.2	Visual inspection	37
8.3	Connection check.....	37
8.4	Voltage-dividing/damping circuit check	38
8.5	Voltage withstand check.....	38
8.6	Check of auxiliaries	38
8.7	Firing check	38
8.8	Cooling system pressure test.....	38
8.9	Partial discharge tests.....	38
9	Optional tests on TCR and TSR valves.....	38
9.1	Overcurrent test	38
9.1.1	Overcurrent with subsequent blocking	38
9.1.2	Overcurrent without blocking	39
9.2	Positive voltage transient during recovery test	39
9.2.1	Objectives.....	39
9.2.2	Test values and waveshapes.....	39
9.2.3	Test procedures	40
9.3	Non-periodic firing test	40
9.3.1	Objectives.....	40
9.3.2	Test values and waveshapes.....	40
9.3.3	Test procedures	41
10	Optional tests on TSC valves	42
10.1	Positive voltage transient during recovery test	42
10.1.1	Test objective	42
10.1.2	Test values and waveshapes.....	42
10.1.3	Test procedures	42
10.2	Non-periodic firing test	42
10.2.1	Objectives.....	42
10.2.2	Test values and waveshapes.....	43
10.2.3	Test procedures	44

Figure 1 – TSC branch.....	33
Figure 2 – One-loop overcurrent.....	34
Figure 3 – Two-loop overcurrent.....	35
Table 1 – List of tests	9
Table 2 – Number of thyristor levels permitted to fail during type tests	15

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**STATIC VAR COMPENSATORS (SVC) –
TESTING OF THYRISTOR VALVES**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61954 has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronic systems and equipment.

This third edition cancels and replaces the second edition published in 2011, Amendment 1:2013 and Amendment 2:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition: important clarifications were made in 4.4.1.2, 5.1.2.2, 5.1.3.2, 5.2.3.2, 6.1.2.2, 6.1.2.4, 6.1.3.2, 6.2.2.2, 6.2.2.4, 6.3.2.2 and 9.3.2.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
22F/642/FDIS	22F/658/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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

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

STATIC VAR COMPENSATORS (SVC) – TESTING OF THYRISTOR VALVES

1 Scope

This document defines type, production and optional tests on thyristor valves used in thyristor controlled reactors (TCR), thyristor switched reactors (TSR) and thyristor switched capacitors (TSC) forming part of static VAR compensators (SVC) for power system applications. The requirements of the document apply both to single valve units (one phase) and to multiple valve units (several phases).

Clauses 4 to 7 detail the type tests, i.e. tests which are carried out to verify that the valve design meets the requirements specified. Clause 8 covers the production tests, i.e. tests which are carried out to verify proper manufacturing. Clauses 9 and 10 detail optional tests, i.e. tests additional to the type and production tests.

2 Normative references

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.

IEC 60060 (all parts), *High-voltage test techniques*

IEC 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60060-2, *High-voltage test techniques – Part 2: Measuring systems*

IEC 60071 (all parts), *Insulation co-ordination*

IEC 60071-1:2019, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

IEC 60700-1:2015, *Thyristor valves for high-voltage direct current (HVDC) power transmission – Part 1: Electrical testing*