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Tap-changers
Part 1: Performance requirements and test methods
(IEC 60214-1:2003)

Changeurs de prises
Partie 1: Prescriptions de performances et méthodes d'essai
(CEI 60214-1:2003)

Stufenschalter
Teil 1: Leistungsanforderungen und Prüfverfahren
(IEC 60214-1:2003)

This European Standard was approved by CENELEC on 2003-03-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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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

Ref. No. EN 60214-1:2003 E

Foreword

The text of document 14/457/FDIS, future edition 1 of IEC 60214-1, prepared by IEC TC 14, Power transformers, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60214-1 on 2003-03-01.

This European Standard supersedes EN 60214:1997.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2003-12-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-03-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A, B, C and ZA are normative and annex D is informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60214-1:2003 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

Publication	Year	Title	EN/HD	Year
IEC 60060	Series	High-voltage test techniques	EN 60060	Series
IEC 60076-1 (mod) A1	1993 1999	Power transformers Part 1: General	EN 60076-1 A11 A1 A12	1997 1997 2000 2002
IEC 60076-3 + corr. December	2000 2000	Part 3: Insulation levels, dielectric tests and external clearances in air	EN 60076-3	2001
IEC 60137	- [1]	Insulated bushings for alternating voltages above 1 000 V	-	-
IEC 60214-2	- [1]	Tap changers Part 2: Application guide	-	-
IEC 60270	- [2]	High-voltage test techniques - Partial discharge measurements	EN 60270	2001 [3]
IEC 60296	- [2]	Specification for unused mineral insulating oils for transformers and switchgear	-	-
IEC 60354	- [2]	Loading guide for oil-immersed power transformers	-	-
IEC 60529	- [2]	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 [3] 1993

[1] At draft stage.

[2] Undated reference.

[3] Valid edition at date of issue.

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Tap-changers –

Part 1: Performance requirements and test methods

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CONTENTS

FOREWORD 11
1 Scope 15
2 Normative references 15
3 Terms and definitions 17
4 Service conditions 29
4.1 Temperature of tap-changer environment 29
4.2 Temperature of motor-drive mechanism environment 29
4.3 Overload conditions 29
5 Requirements for on-load tap-changers 29
5.1 General requirements 29
5.1.1 Rating 29
5.1.2 Liquid filled compartments for diverter and selector switches 31
5.1.3 Liquid-level gauges 31
5.1.4 Safety requirements for protection against increase in pressure 31
5.1.5 Limiting devices for the protection against transient overvoltages 33
5.1.6 Change-over selector recovery voltages 33
5.1.7 Coarse fine regulation leakage inductance switching 33
5.2 Type tests 33
5.2.1 Temperature rise of contacts 35
5.2.2 Switching tests 35
5.2.3 Short-circuit current test 41
5.2.4 Transition impedance test 43
5.2.5 Mechanical tests 45
5.2.6 Dielectric tests 49
5.2.7 Type-test certificate 59
5.3 Routine tests 59
5.3.1 Mechanical tests 59
5.3.2 Sequence tests 59
5.3.3 Auxiliary circuits insulation test 59
5.3.4 Pressure and vacuum tests 61
5.4 Special tests 61
5.4.1 General 61
5.4.2 Dielectric discharge tests 61
6 Requirements for motor drive mechanisms for on-load tap-changers 61
6.1 General requirements 61
6.1.1 Compliance of component parts 61
6.1.2 Permissible variation of auxiliary supply 61
6.1.3 Step-by-step control 61
6.1.4 Tap position indicator 61
6.1.5 Tap-change in progress indication 61
6.1.6 Limiting devices 63
6.1.7 Parallel control devices 63
6.1.8 Direction of rotation protection 63

6.1.9 Overcurrent blocking device 63
6.1.10 Restarting device 63
6.1.11 Operation counter 63
6.1.12 Manual operation of the motor-drive mechanism 63
6.1.13 Motor-drive cubicle 63
6.1.14 Protective device against running-through 63
6.1.15 Protection against access to hazardous parts 65
6.2 Type tests 65
6.2.1 Mechanical load test 65
6.2.2 Overrun test 65
6.2.3 Degree of protection of motor-drive cubicle 65
6.3 Routine tests 65
6.3.1 Mechanical tests 65
6.3.2 Auxiliary circuits insulation test 67
7 Requirements for off-circuit tap-changers 67
7.1 General requirements 67
7.1.1 Rated characteristics 67
7.1.2 Types 67
7.1.3 Handles and drives 67
7.1.4 Glands 67
7.1.5 Interlocks 67
7.1.6 Mechanical end stops 69
7.2 Type tests 69
7.2.1 General 69
7.2.2 Temperature rise of contacts 69
7.2.3 Short-circuit current test 71
7.2.4 Mechanical tests 73
7.2.5 Dielectric tests 73
7.2.6 Type test certificate 77
7.3 Routine tests 77
7.3.1 Mechanical tests 77
7.3.2 Pressure and vacuum tests 77
8 Requirements for motor drive mechanisms for off-circuit tap-changers 79
8.1 General requirements 79
8.1.1 Compliance of component parts 79
8.1.2 Permissible variation of auxiliary supply 79
8.1.3 Tap position indicator 79
8.1.4 Limiting devices 79
8.1.5 Operation counter 79
8.1.6 Manual operation of the motor-drive mechanism 79
8.1.7 Motor-drive cubicle 81
8.1.8 Protection against access to hazardous parts 81
8.2 Type tests 81
8.2.1 Mechanical load test 81
8.2.2 Overrun test 81
8.2.3 Degree of protection of motor-drive cubicle 81

8.3 Routine tests 83
8.3.1 Mechanical tests 83
8.3.2 Auxiliary circuits insulation test 83
9 Nameplate 83
9.1 Tap-changers (on-load and off-circuit) 83
9.2 Motor-drive mechanisms 83
10 Off-circuit tap-changer warning label 85
11 Manufacturers operating instructions 85

Annex A (normative) Supplementary information on switching duty relating to resistor type tap-changers 87
Annex B (normative) Supplementary information on switching duty relating to reactor type tap-changers 93
Annex C (normative) Method for determining the equivalent temperature of the transition resistor using power pulse current 115
Annex D (informative) Simulated circuits for service duty and breaking capacity tests 117

Figure 1 – Short-circuit test current as a multiple of the maximum rated through-current 43
Figure 2 – Time sequence for the application of test voltage 57
Figure 3 – Short-circuit test current as a multiple of the maximum rated through-current 71
Figure 4 – Warning label 85
Figure A.1 – Current and voltage vectors for resistor type tap-changers 87
Figure B.1 – Operating sequence of reactor type tap-changers with selector switch 95
Figure B.2 – Current and voltage vectors for reactor type tap-changers with selector switch 97
Figure B.3 – Operating sequence of reactor type tap-changers with selector switch and equalizer windings 99
Figure B.4 – Current and voltage vectors for reactor type tap-changers with selector switch and equalizer windings 101
Figure B.5 – Operating sequence of a reactor type tap-changer with diverter switch and tap selector 105
Figure B.6 – Current and voltage vectors for reactor type tap-changers with diverter switch and tap selector 107
Figure B.7 – Operating sequence of a reactor type tap-changer with vacuum interrupter and tap selector 111
Figure B.8 – Current and voltage vectors for reactor type tap-changers with vacuum interrupter and tap selector 113
Figure D.1 – Simulated test circuit – transformer method 117
Figure D.2 – Simulated test circuit – resistance method 119

Table 1 – Temperature of tap-changer environment 29
Table 2 – Contact temperature-rise limits 35
Table 3 – Classes of on-load tap-changer 49

Table 4 – Rated withstand voltages – Series I based on European practice 51
Table 5 – Rated withstand voltages – Series II based on North American Practice 53
Table 6 – Contact temperature-rise limits for off-circuit tap-changers 69
Table 7 – Classes of off-circuit tap-changer 75
Table A.1 – Duty on main and transition contacts for resistor type tap-changers 89
Table A.2 – Effect of load power-factor on circuit-breaking duty for resistor type tap-changers 91
Table B.1 – Duty on switching contacts for reactor type tap-changers with selector switch – switching direction from P1 to P5 95
Table B.2 – Duty on switching contacts for reactor type tap-changers with selector switch and equalizer windings – switching direction from P1 to P5 99
Table B.3 – Duty on switching contacts for reactor type tap-changers with diverter switch and tap selector – switching direction from P1 to P7 103
Table B.4 – Duty on switching contacts for reactor type tap-changers with vacuum interrupter and tap selector – switching direction from P1 to P11 109

INTERNATIONAL ELECTROTECHNICAL COMMISSION

TAP-CHANGERS –

Part 1: Performance requirements and test methods

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60214-1 has been prepared by IEC technical committee 14: Power transformers

This first edition of IEC 60214-1 cancels and replaces IEC 60214 published in 1989. This first edition constitutes a technical revision.

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

FDIS	Report on voting
14/457/FDIS	14/462/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 60214 consists of the following parts, under the general title *Tap-changers*:

Part 1: Performance requirements and test methods

Part 2: Application guide *(under consideration)*

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

TAP-CHANGERS –

Part 1: Performance requirements and test methods

1 Scope

This part of IEC 60214 applies to on-load tap-changers of both resistor and reactor types, off-circuit tap-changers, and their motor drive mechanisms. It applies mainly to tap-changers immersed in transformer oil according to IEC 60296 but may also be used for tap-changers with gas insulation or immersed in other insulating liquids insofar as conditions are applicable.

It applies to power and distribution transformers of all types and also to reactors.

It does not apply to transformers and reactors mounted on railway rolling stock.

2 Normative references

The following referenced documents are indispensable for the application 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, *High voltage test techniques*

IEC 60076-1:2000, *Power transformers – Part 1: General*

IEC 60076-3:2000, *Power transformers – Part 3: Insulation levels, dielectric tests and external clearances in air*

IEC 60137, *Insulated Bushings for alternating voltages above 1000 volts*[1]

IEC 60214-2, *Tap-changers – Part 2: Application guide* [2]

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

IEC 60296, *Specification for unused mineral insulating oils for transformers and switchgear*

IEC 60354, *Loading guide for oil-immersed transformers*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

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1 To be published.

2 At present under revision, document currently IEC 60542.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
on-load tap-changer
device for changing the tap of a winding, suitable for operation whilst the transformer is energized or on load

3.2
tap selector
device designed to carry, but not to make or break, current, used in conjunction with a diverter switch to select tap connections

3.3
diverter switch
switching device used in conjunction with a tap selector to carry, make or break currents in circuits which have already been selected

NOTE Diverter switches are sometimes called arcing switches.

3.4
selector switch
switching device capable of making, carrying and breaking current, combining the duties of a tap selector and a diverter switch

NOTE Selector switches are sometimes called arcing tap switches.

3.5
off-circuit tap-changer
device for changing the tap of a winding, suitable for operation only when the transformer is de-energized

3.6
change-over selector
device designed to carry, but not to make or break, current, used in conjunction with the tap selector or selector switch to enable its contacts and the connection taps to be used more than once when moving from one extreme position to the other

3.7
coarse change-over selector
change-over selector connecting the tapped winding to either the coarse winding or the main winding or parts thereof

3.8
reversing change-over selector
change-over selector connecting either end of the tapped winding to the main winding

3.9
transition impedance
resistor or reactor consisting of one or more units bridging the tap in use and the tap next to be used, for the purpose of transferring load from one tap to the other without interruption or appreciable change in the load current, at the same time limiting the circulating current for the period that both taps are used

NOTE For reactor type tap-changers, the transition impedance (reactor) is commonly called a preventive auto transformer. Reactor type tap-changers normally use the bridging position as a service position (mid-point or centre tapped reactor tap-changers) and, therefore the reactor is designed for continuous operation.