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Power transformers –
Part 21: Standard requirements, terminology, and test code for step-voltage regulators

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CONTENTS

FOREWORD 9
1 Scope 11
2 Normative references 11
2.1 IEC references 11
2.2 IEEE references 11
2.3 SAE references 12
3 Terms and definitions 12
4 Use of normative references 16
5 Service conditions 17
5.1 Usual service conditions 17
5.1.1 General 17
5.1.2 Temperature 17
5.1.3 Altitude 17
5.1.4 Supply voltage 17
5.1.5 Load current 17
5.1.6 Outdoor operation 17
5.1.7 Tank or enclosure finish 17
5.2 Loading at other than rated conditions 18
5.3 Unusual service conditions 18
5.3.1 General 18
5.3.2 Unusual temperature and altitude conditions 18
5.3.3 Insulation at high altitude 18
5.3.4 Other unusual service conditions 19
6 Rating data 20
6.1 Cooling classes of voltage regulators 20
6.1.1 General 20
6.1.2 Liquid-immersed (fire point ≤ 300 °C) air-cooled 20
6.1.3 Liquid-immersed (fire point > 300 °C) air-cooled 20
6.2 Ratings 20
6.2.1 General 20
6.2.2 Terms in which rating is expressed 21
6.2.3 Preferred ratings 21
6.2.4 Supplementary voltage ratings 26
6.3 Supplementary continuous-current ratings 27
6.3.1 General 27
6.3.2 Optional forced-air ratings 27
6.4 Taps 28
6.5 Voltage supply ratios 28
6.6 Insulation levels 28
6.7 Losses 29
6.7.1 General 29
6.7.2 Total loss 29
6.7.3 Tolerance for losses 29
6.7.4 Determination of losses and excitation current 29
6.8 Short-circuit requirements 30

6.8.1 General 30
6.8.2 Mechanical capability demonstration 31
6.8.3 Thermal capability of voltage regulators for short-circuit conditions 31
6.9 Sound pressure level for liquid-immersed voltage regulators 31
6.10 Tests 32
6.10.1 General 32
6.10.2 Routine tests 32
6.10.3 Type tests 32
7 Construction 33
7.1 Bushings 33
7.2 External dielectric clearances 34
7.3 Terminal markings 34
7.4 Diagram of connections 35
7.5 Nameplates 36
7.6 Tank construction 37
7.6.1 General 37
7.6.2 Pressure-relief valve 37
7.6.3 Cover assembly 37
7.6.4 Sudden pressure relay 38
7.6.5 Lifting lugs 38
7.6.6 Support lugs 38
7.6.7 Substation bases 40
7.6.8 Tank grounding provisions 40
7.7 Components and accessories 41
7.7.1 Components for full automatic control and operation 41
7.7.2 Accessories for single-phase step-voltage regulators 41
7.7.3 Accessories for three-phase step-voltage regulators 42
8 Other requirements 42
8.1 General 42
8.2 Other components and accessories 42
8.2.1 General 42
8.2.2 Single- and three-phase voltage regulators 42
8.2.3 Three-phase voltage regulators 43
9 Test code 43
9.1 General 43
9.2 Resistance measurements 43
9.2.1 General 43
9.2.2 Determination of cold temperature 43
9.2.3 Conversion of resistance measurements 44
9.2.4 Resistance measurement methods 44
9.3 Polarity test 45
9.3.1 General 45
9.3.2 Polarity by inductive kick 46
9.3.3 Polarity by ratio meter 46
9.4 Ratio test 46
9.4.1 General 46
9.4.2 Taps 46

9.4.3 Voltage and frequency 47
9.4.4 Three-phase voltage regulators 47
9.4.5 Tolerance for ratio 47
9.4.6 Ratio test methods 47
9.5 No-load loss and excitation current 49
9.5.1 General 49
9.5.2 No-load loss test 50
9.5.3 Waveform correction of no-load loss 51
9.5.4 Test methods for three-phase voltage regulators 52
9.5.5 Determination of excitation (no-load) current 52
9.5.6 Measurements 53
9.5.7 Correction of loss measurement due to metering phase-angle errors 53
9.6 Load loss and impedance voltage 54
9.6.1 General 54
9.6.2 Factors affecting the values of load loss and impedance voltage 55
9.6.3 Tests for measuring load loss and impedance voltage 56
9.6.4 Calculation of load loss and impedance voltage from test data 58
9.7 Dielectric tests 60
9.7.1 General 60
9.7.2 Lightning impulse type test 61
9.7.3 Lightning impulse routine test 67
9.7.4 Applied-voltage test 69
9.7.5 Induced-voltage test 69
9.7.6 Insulation power factor tests 71
9.7.7 Insulation resistance tests 72
9.8 On-load tap-changer routine tests 73
9.8.1 General 73
9.8.2 Mechanical test 74
9.8.3 Auxiliary circuits insulation test 74
9.9 Control system routine tests 74
9.9.1 Applied voltage 74
9.9.2 Operation 74
9.10 Temperature-rise test 74
9.10.1 General 74
9.10.2 Test methods 75
9.10.3 Resistance measurements 78
9.10.4 Temperature measurements 79
9.10.5 Correction of temperature-rise test results 82
9.11 Short-circuit test 83
9.11.1 General 83
9.11.2 Test connections 83
9.11.3 Test requirements 84
9.11.4 Test procedure 84
9.11.5 Proof of satisfactory performance 86
9.12 Determination of sound level 87
9.12.1 General 87
9.12.2 Applicability 88

9.12.3 Instrumentation 88
9.12.4 Test conditions 88
9.12.5 Microphone positions 90
9.12.6 Sound level measurements 91
9.12.7 Determination of sound level of a voltage regulator 95
9.12.8 Presentation of results 97
9.13 Calculated data 98
9.13.1 Reference temperature 98
9.13.2 Loss and excitation current 99
9.13.3 Efficiency 99
9.13.4 Calculation of winding temperature during a short-circuit 99
9.13.5 Certified test data 101
10 Component tests 102
10.1 General 102
10.2 Enclosure integrity 102
10.2.1 General 102
10.2.2 Static pressure 102
10.2.3 Dynamic pressure 103
10.2.4 Type test for fault current capability of a voltage regulator enclosure 103
10.3 On-load tap-changer 104
10.3.1 General 104
10.3.2 Type tests 104
10.4 Control system 109
10.4.1 General 109
10.4.2 Control device construction 110
10.4.3 Accuracy 110
10.4.4 Type tests 112
11 Universal interface 116
11.1 Connection between control enclosure and apparatus 116
11.2 Universal interface connector 117
Annex A (informative) Unusual temperature and altitude conditions 120
A.1 Unusual temperatures and altitude service conditions 120
A.2 Effects of altitude on temperature-rise 120
A.3 Operation at rated kVA 120
A.4 Operation at less than rated kVA 120
Annex B (informative) Field dielectric tests 121
B.1 Tests on bushings 121
B.2 Dielectric tests in the field 121
Annex C (informative) Step-voltage regulator construction 122
C.1 General 122
C.2 Type A 123
C.3 Type B 123
C.4 Series transformer construction 124
C.5 Reactor circuit 124
C.6 Equalizer winding 124
Annex D (informative) Hazards of Bypass off Neutral 126

Annex E (informative) Overloading of step-voltage regulators 130
Annex F (informative) Power capacitor and distributed generation compatibility 134
F.1 Power capacitor application issues 134
F.1.1 General 134
F.1.2 Power circuit for consideration 134
F.1.3 Voltage regulator incorporating line-drop compensation (LDC) in the control 134
F.1.4 Voltage regulator incorporating line current compensation (LCC) in the control 137
F.2 Distributed generation application issues 137
F.2.1 General 137
F.2.2 Control operation with power reversal recognition 138
F.2.3 Power circuit for consideration 139
F.2.4 Distributed generator alternatives 139
F.2.5 P-Q summary 140
F.2.6 Example system with distribution generation (DG) 140
F.2.7 Expanded example, distributed generation mode 142
F.2.8 Caveats 142
F.2.9 Conclusions 142
Bibliography 143

Figure 1 – Single-phase voltage regulators 35
Figure 2 – Three-phase voltage regulators with two arrangements of bushings 35
Figure 3 – Type-B support lugs 39
Figure 4 – Type-C support lugs 40
Figure 5 – Connections for voltmeter-ammeter method of resistance measurement 44
Figure 6 – Voltage regulator connected for polarity testing – Voltage regulator in Neutral position 46
Figure 7 – Voltmeter arranged to read the difference between the two output side voltages 48
Figure 8 – Voltmeters arranged to read the two series winding voltages 48
Figure 9 – Basic circuit of ratio meter 49
Figure 10 – Connection for no-load loss test of single-phase voltage regulator without instrument transformers 50
Figure 11 – Connections for no-load loss test of a single-phase voltage regulator with instrument transformers 51
Figure 12 – Three-phase voltage regulator connections for no-load loss and excitation current test using three-wattmeter method 53
Figure 13 – Single-phase voltage regulator connections for load loss and impedance voltage test without instrument transformers 57
Figure 14 – Single-phase voltage regulator connections for load loss and impedance voltage test with instrument transformers 57
Figure 15 – Three-phase voltage regulator connections for load loss and impedance voltage test using the three-wattmeter method 58
Figure 16 – Example of loading back method: single-phase 76
Figure 17 – Example of loading back method: three-phase 77

Figure 18 – Microphone location for measuring sound level 90
Figure 19 – Sound reflection correction factor "K" calculated as per Equation (29) 94
Figure 20 – Measurements using the sound pressure method 98
Figure 21 – Measurements using the sound intensity method 98
Figure 22 – Universal interface specification 117
Figure 23 – Socket/pin detail for universal interface 117
Figure 24 – Universal interface locations 119
Figure C.1 – Basic diagram of single-phase, Type A, step-voltage regulator 122
Figure C.2 – Basic diagram of single-phase, Type B, step-voltage regulator 122
Figure C.3 – Type A 123
Figure C.4 – Type B 123
Figure C.5 – Example of series transformer construction 124
Figure C.6 – Equalizer winding and reactor circuitry – Non-bridging tap position 125
Figure C.7 – Equalizer winding and reactor circuitry – Bridging tap position 125
Figure D.1 – "Bypass off Neutral" power circuit 127
Figure D.2 – Example of "Bypass off Neutral" RMS symmetrical current pattern of a Type A design 128
Figure D.3 – Example of "Bypass off Neutral" RMS symmetrical current pattern of a Type B design 129
Figure E.1 – Example of overload capability by tap position 131
Figure E.2 – Example of Type A load loss vs tap position 131
Figure E.3 – Example of Type B load loss vs tap position 132
Figure E.4 – Tap-changer arc interruption envelope 132
Figure E.5 – Contact wear 133
Figure F.1 – Power distribution substation and representative distribution feeder 134
Figure F.2 – Power distribution system with distributed generation 139
Figure F.3 – P-Q diagram quadrant relationships 140

Table 1 – Dielectric strength correction factors for altitudes greater than 1 000 m (3 300 ft) 19
Table 2 – Limits of temperature-rise 21
Table 3 – Ratings for liquid-immersed 60 Hz step-voltage regulators (single-phase) 22
Table 4 – Ratings for liquid-immersed 50 Hz step-voltage regulators (single-phase) 23
Table 5 – Ratings for liquid-immersed 60 Hz step-voltage regulators (three-phase) 25
Table 6 – Ratings for liquid-immersed 50 Hz step-voltage regulators (three-phase) 26
Table 7 – Supplementary voltage ratings 26
Table 8 – Supplementary continuous-current ratings 27
Table 9 – Forced-air ratings relationship 28
Table 10 – Values of voltage supply ratios 28
Table 11 – Interrelationships of dielectric insulation levels for voltage regulators 29
Table 12 – Values of k 30
Table 13 – Maximum no-load (excitation) sound pressure levels 31

Table 14 – Electrical characteristics of voltage regulator bushings 34
Table 15 – External dielectric clearances 34
Table 16 – Bushing terminal applications 41
Table 17 – Requirements for phase-angle error correction 54
Table 18 – Measurements to be made in insulation power factor tests 72
Table 19 – Ambient sound pressure level correction 92
Table 20 – Approximate values of the average acoustic absorption coefficient 93
Table 21 – Voltage level values for select line-drop compensation 112
Table 22 – Control supply voltage 115
Table 23 – Socket pin identification for connector 118
Table A.1 – Maximum allowable average temperature of cooling air for rated kVA[a] 120
Table A.2 – Rated kVA correction factors for altitudes greater than 1 000 m (3 300 ft) 120
Table F.1 – Relevant system voltages and currents with capacitor location 136
Table F.2 – System and voltage regulator control response with example distributed generation (DG), no line-drop compensation 141

POWER TRANSFORMERS –

Part 21: Standard requirements, terminology, and test code for step-voltage regulators

FOREWORD

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International Standard IEC 60076-21/IEEE Std C57.15-2017 has been prepared by IEC technical committee 14: Power transformers, in cooperation with the Transformers Committee of the IEEE Power and Energy Society[1], under the IEC/IEEE Dual Logo Agreement.

This publication is published as an IEC/IEEE Dual Logo standard. This second edition cancels and replaces IEC 60076-21, published in 2011, and IEEE Std C57.15-2009.

This edition includes the following significant technical changes with respect to IEC 60076-21:2011/IEEE Std C57.15-2009:

a) updated list of normative and bibliography IEC and IEEE references and their associated text;
b) updated tables of preferred ratings for inclusion of maximum system voltage (U_m), nominal system voltage and rated voltage (U_r);
c) inclusion of tables for optional fan-cooled ratings, external dielectric clearances and sound pressure levels;
d) revision of short-circuit requirements for distribution and substation voltage regulators;
e) inclusion of an universal interface between control enclosure and apparatus;
f) inclusion of tap-changer routine and type tests;
g) inclusion of audible sound pressure emissions test procedures;
h) inclusion of tank enclosure integrity type test procedures;
i) update of control environmental IEC reference test standard.

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

FDIS	Report on voting
14/974/FDIS	14/989/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.

International standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

A list of parts of the 60076 International Standard, published under the general title *Power transformers*, can be found on the IEC website.

The IEC Technical Committee and IEEE Technical Committee have decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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
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A bilingual version of this publication may be issued at a later date.

[1] A list of IEEE participants can be found at the following URL: https://standards.ieee.org/standard/C57.15-2017.html

POWER TRANSFORMERS –

Part 21: Standard requirements, terminology, and test code for step-voltage regulators

1 Scope

This document describes electrical, mechanical and test requirements of liquid-immersed, single- and three-phase, 50 Hz and 60 Hz, self and forced-air cooled, distribution, overhead and substation, step-voltage regulators, 1 000 kVA (single-phase units) or 3 000 kVA (three-phase units) and smaller, 34 500 volts and below (2 400 V minimum) and their associated controls.

Requirements, references and definitions relevant to either IEC or IEEE contexts are given and their use is described in Clause 4.

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.

2.1 IEC references

IEC 60050-421, *International Electrotechnical Vocabulary – Chapter 421: Power transformers and reactors*

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

IEC 60076-2, *Power transformers – Part 2: Temperature rise for liquid-immersed transformers*

IEC 60255-1, *Measuring relays and protection equipment – Part 1: Common requirements*

IEC 60255-21-1, *Electrical relays – Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment – Section One: Vibration tests (sinusoidal)*

IEC 60255-26, *Measuring relays and protection equipment – Part 26: Electromagnetic compatibility requirements*

IEC 60255-27, *Measuring relays and protection equipment – Part 27: Product safety requirements*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

2.2 IEEE references

IEEE Std 4™, *IEEE Standard Techniques for High-Voltage Testing*