

TECHNICAL REPORT



Short-circuit currents in three-phase AC systems – Part 4: Examples for the calculation of short-circuit currents

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CONTENTS

FOREWORD	6
1 Scope	8
2 Normative references	8
3 Terms and definitions, symbols and indices, and formulae	8
4 Positive-sequence, negative-sequence and zero-sequence impedances of electrical equipment	9
4.1 General	9
4.2 Overhead lines, cables and short-circuit current-limiting reactors	9
4.3 Transformers	10
4.3.1 General	10
4.3.2 Example	15
4.4 Generators and power station units	17
4.4.1 General	17
4.4.2 Example	20
5 Calculation of short-circuit currents in a low-voltage system $U_n = 400\text{ V}$	22
5.1 Problem	22
5.2 Determination of the positive-sequence impedances	22
5.2.1 Network feeder	22
5.2.2 Transformers	23
5.2.3 Lines (cables and overhead lines)	24
5.3 Determination of the zero-sequence impedances	24
5.3.1 Transformers	24
5.3.2 Lines (cables and overhead lines)	25
5.4 Calculation of I_k'' and i_p for three-phase short circuits	25
5.4.1 Short-circuit location F1	25
5.4.2 Short-circuit location F2	27
5.4.3 Short-circuit location F3	28
5.5 Calculation of I_{k1}'' and i_{p1} for line-to-earth short circuits	28
5.5.1 Short-circuit location F1	28
5.5.2 Short-circuit location F2	29
5.5.3 Short-circuit location F3	29
5.6 Collection of results	30
6 Calculation of three-phase short-circuit currents in a medium-voltage system – Influence of asynchronous motors	31
6.1 Problem	31
6.2 Complex calculation with absolute quantities	31
6.3 Calculation with per-unit quantities	35
6.4 Calculation with the superposition method	37
7 Calculation of three-phase short-circuit currents for a power station unit and the auxiliary network	40
7.1 Problem	40
7.2 Short-circuit impedances of electrical equipment	43
7.2.1 Network feeder	43
7.2.2 Power station unit	43
7.2.3 Auxiliary transformers	44

7.2.4	Low-voltage transformers 2,5 MVA and 1,6 MVA	45
7.2.5	Asynchronous motors	49
7.3	Calculation of short-circuit currents	49
7.3.1	Short-circuit location F1	49
7.3.2	Short-circuit location F2	50
7.3.3	Short-circuit location F3	51
7.3.4	Short-circuit location F4	55
7.3.5	Short-circuit location F5	57
8	Calculation of three-phase short-circuit currents in a wind power plant	59
8.1	General	59
8.2	Problem	59
8.3	Data and short-circuit impedances of electrical equipment	60
8.4	Nodal admittance and nodal impedance matrices	62
8.5	Short-circuit currents for the wind power plant with ten wind power station units WD	63
8.6	Short-circuit currents for the wind power plant with ten wind power station units WF	65
8.7	Short-circuit currents for the wind power plant with five wind power station units WD and five wind power station units WF	68
9	Test network for the calculation of short-circuit currents with digital programs in accordance with IEC 60909-0	72
9.1	General	72
9.2	High-voltage test network 380 kV/110 kV/30 kV/10 kV	73
9.2.1	Network topology and data	73
9.2.2	Short-circuit impedances of electrical equipment	76
9.3	Results	77
9.3.1	General	77
9.3.2	Three-phase short-circuit currents	78
9.3.3	Line-to-earth short-circuit currents	78
	Bibliography	80
	Figure 1 – Positive-sequence and zero-sequence impedances of an overhead line (one circuit) and cable (cross-bonded)	9
	Figure 2 – Positive-sequence and zero-sequence impedance of a short-circuit current-limiting reactor	10
	Figure 3 – Positive-sequence and zero-sequence system impedances of a two-winding transformer YNd5	11
	Figure 4 – Equivalent circuits of a three-winding network transformer	15
	Figure 5 – Short circuit at the high-voltage side of a power station unit with on-load tap changer	19
	Figure 6 – Low-voltage system $U_n = 400$ V with short-circuit locations F1, F2, F3	22
	Figure 7 – Positive-sequence system (according to Figure 6) for the calculation of I_k'' at the short-circuit location F1	26
	Figure 8 – Positive-sequence, negative-sequence and zero-sequence system with connections at the short-circuit location F1 for the calculation of I_{k1}''	29
	Figure 9 – Medium-voltage network 33 kV/6 kV: data	32

Figure 10 – Short-circuit current $I''_{k(T1,T2)S}$ calculated by the superposition method (S) compared with $I''_{k(T1,T2)IEC}$ calculated by the IEC method of equivalent voltage source at the short-circuit location, depending on the load S^b and the voltage U^b 39

Figure 11 – Short-circuit current I''_{kS} calculated by the superposition method (S) compared with I''_{kIEC} calculated by the IEC method of equivalent voltage source at the short-circuit location, depending on the transformation ratio t before the short circuit..... 40

Figure 12 – Power station unit (generator and unit transformer with on-load tap-changer) and auxiliary network with medium- and low-voltage asynchronous motors: data 42

Figure 13 – Positive-sequence system for the calculation of the short-circuit currents at the location F3 (see Figure 12) 52

Figure 14 – Positive-sequence system for the calculation of the short-circuit currents at the location F4 (see Figure 12) 55

Figure 15 – Positive-sequence system for the calculation of the short-circuit currents at the location F5 (see Figure 12) 57

Figure 16 – Windfarm with ten wind power station units 60

Figure 17 – Equivalent circuit diagram for the calculation of the short-circuit current at the location F1 without the consideration of the internal wind power plant cables (values are related to the 20 kV voltage level), variant 1 64

Figure 18 – Equivalent circuit diagram for the calculation of the short-circuit current at the location F1 without the consideration of the internal wind power plant cables (values are related to the 20 kV voltage level), variant 2 67

Figure 19 – Equivalent circuit diagram for the calculation of the short-circuit current at the location F1 without the consideration of the internal wind power plant cables (values are related to the 20 kV voltage level), variant 3 70

Figure 20 – High-voltage AC test network 380 kV/110 kV/30 kV/10 kV 74

Table 1 – Examples for equivalent circuit-diagrams of transformers in the positive-sequence and the zero-sequence system 12

Table 2 – Approximations for the ratios $X_{(0)T}/X_T$ of two- and three-winding transformers 15

Table 3 – Data of electrical equipment for the example in Figure 6 – Positive-sequence and zero-sequence impedances ($Z_{(2)} = Z_{(1)}$)..... 23

Table 4 – Short-circuit impedances and short-circuit currents 30

Table 5 – Joule integral depending on T_k at the short-circuit location F2 and F3 30

Table 6 – Calculation of the short-circuit impedances of electrical equipment and $\underline{Z}_{k(T1,T2)}$ at the short-circuit location F, without motors (circuit-breakers CB1 and CB2 are open) 33

Table 7 – Calculation of the per-unit short-circuit reactances of electrical equipment and $*X_{k(T1,T2)}$ at the short-circuit location F 36

Table 8 – Data of transformers 10 kV/0,73 kV and 10 kV/0,42 kV, data of low-voltage motor groups and partial short-circuit currents of these motor groups on busbars B and C respectively 47

Table 9 – Data of medium-voltage asynchronous motors and their partial short-circuit currents at short-circuit locations on busbars B and C respectively 48

Table 10 – Data and impedances of the electrical equipment (see Figure 16) referred to the 20 kV side 61

Table 11 – The diagonal elements of the nodal admittance matrices for the three variants in $1/\Omega$	62
Table 12 – Short-circuit impedances and short-circuit currents at F1 to F14 for wind power stations units with doubly fed asynchronous generators WD	63
Table 13 – Short-circuit impedances and short-circuit currents at F1 to F3 for wind power stations units with doubly fed asynchronous generators WD neglecting the internal wind power plant cables	64
Table 14 – Quotients Z_{ij}/Z_{kFi} for $i = 1$ to 14 and $j = 3...6, 8...10, 12...14$ and the sum of the columns	66
Table 15 – Short-circuit impedances and short-circuit currents at F1 to F14 for wind power stations units with full size converters WF	66
Table 16 – Short-circuit impedances and short-circuit currents at F1 to F3 for wind power stations units with full size converters WF neglecting the internal wind power plant cables	68
Table 17 – Quotients Z_{ij}/Z_{kFi} for $i = 1$ to 14 and $j = 3, 10, 12, 13, 14$ and the sum of the columns	69
Table 18 –Short-circuit impedances and short-circuit currents at F1 to F14 for five wind power stations units with doubly fed asynchronous generators WD and five wind power station units with full size converters WF	69
Table 19 – Short-circuit impedances and short-circuit currents at F1 to F3 for five wind power stations units with doubly fed asynchronous generators WD and five wind power station units with full size converters WF neglecting the internal wind power plant cables	71
Table 20 – Overhead lines and cables	76
Table 21 – Impedances (corrected if necessary) of the electrical equipment (see Figure 20) referred to the 110 kV side with $Z_{(2)} = Z_{(1)}$	77
Table 22 – Results I_k'' , i_p , I_b and I_k	78
Table 23 – Results I_k'' and i_{p1}	79

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SHORT-CIRCUIT CURRENTS IN THREE-PHASE AC SYSTEMS –

Part 4: Examples for the calculation of short-circuit currents

FOREWORD

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IEC TR 60909-4 has been prepared by IEC technical committee 73: Short-circuit currents. It is a Technical Report.

This second edition cancels and replaces the first edition published in 2000. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) adaption to IEC 60909-0:2016;
- b) addition of an example for the calculation of short-circuit currents of wind power station units;
- c) correction of errors.

The text of this Technical Report is based on the following documents:

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

The language used for the development of this Technical Report 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.

A list of all parts in the IEC 60909 series, published under the general title *Short-circuit currents in three-phase AC systems*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under 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.

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SHORT-CIRCUIT CURRENTS IN THREE-PHASE AC SYSTEMS –

Part 4: Examples for the calculation of short-circuit currents

1 Scope

This part of IEC 60909, which is a Technical Report, is intended to give help for the application of IEC 60909-0 for the calculation of short-circuit currents in 50 Hz or 60 Hz three-phase AC systems.

This document does not include additional requirements but gives support for the modelling of electrical equipment in the positive-sequence, the negative-sequence and the zero-sequence system (Clause 4), the practical execution of calculations in a low-voltage system (Clause 5), a medium-voltage system with asynchronous motors (Clause 6) and a power station unit with its auxiliary network feeding a large number of medium-voltage asynchronous motors and low-voltage motor groups (Clause 7).

The three examples given in Clauses 5, 6 and 7 are similar to those given in IEC TR 60909-4:2000 but they are revised in accordance with IEC 60909-0, which replaces it. The example given in Clause 8 is new and mirrors the introduction of the new 6.8 of IEC 60909-0:2016.

Clause 9 gives the circuit diagram and the data of a test network and the results for a calculation carried out in accordance with IEC 60909-0, to offer the possibility for a comparison between the results found with a digital program for the calculation of short-circuit currents and the given results for I_k'' , i_p , I_b , I_k , I_{k1}'' and i_{p1} in a high-voltage network with power station units, generators, asynchronous motors and lines in four different voltage levels 380 kV, 110 kV, 30 kV and 10 kV.

2 Normative references

IEC 60038:2009, *IEC standard voltages*

IEC 60909-0:2016, *Short-circuit currents in three-phase a.c. systems – Part 0: Calculation of currents*