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TECHNICAL REPORT

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

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SHORT-CIRCUIT CURRENTS IN THREE-PHASE AC SYSTEMS –

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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:

Draft	Report on voting
73/187/DTR	73/193/RVDTR

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- withdrawn,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*

3 Terms and definitions, symbols and indices, and formulae

For the purposes of this document, the terms and definitions, symbols and indices, and formulae given in IEC 60909-0 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp