Irish Standard
I.S. EN 60865-1:2012

Short-circuit currents - Calculation of effects -- Part 1: Definitions and calculation methods (IEC 60865-1:2011 (EQV))

I.S. EN 60865-1:2012

Incorporating amendments/corrigenda issued since publication:

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I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces:	*This document is based on:*	*Published:*
EN 60865-1:1993	EN 60865-1:2012 EN 60865-1:1993	23 March, 2012 20 December, 1993

This document was published
under the authority of the NSAI and comes into effect on:

17 April, 2012

ICS number:
17.220.01
29.240.20

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I.S. EN 60865-1:2012

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60865-1

March 2012

ICS 17.220.01; 29.240.20

Supersedes EN 60865-1:1993

English version

Short-circuit currents - Calculation of effects - Part 1: Definitions and calculation methods

(IEC 60865-1:2011)

Courants de court-circuit - Calcul des effets - Partie 1: Définitions et méthodes de calcul (CEI 60865-1:2011)

Kurzschlussströme - Berechnung der Wirkung - Teil 1: Begriffe und Berechnungsverfahren (IEC 60865-1:2011)

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 60865-1:2012 E

Foreword

The text of document 73/152/CDV, future edition 3 of IEC 60865-1, prepared by IEC/TC 73 "Short-circuit currents" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60865-1:2012.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2012-09-23
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2014-11-28

This document supersedes EN 60865-1:1993.

EN 60865-1:2012 includes the following significant technical changes with respect to EN 60865-1:1993:

— The determinations for automatic reclosure together with rigid conductors have been revised.

— The influence of mid-span droppers to the span has been included.

— For vertical cable-connection the displacement and the tensile force onto the lower fixing point may now be calculated.

— Additional recommendations for foundation loads due to tensile forces have been added.

— The subclause for determination of the thermal equivalent short-circuits current has been deleted (it is now part of EN 60909-0).

— The regulations for thermal effects of electrical equipment have been deleted.

— The standard has been reorganized and some of the symbols have been changed to follow the conceptual characteristic of international standards.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60865-1:2011 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 61936-1	NOTE	Harmonized as EN 61936-1.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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 60909	Series	Short-circuit currents calculation in three-phase a.c. systems	EN 60909	Series
IEC 60909-0	-	Short-circuit currents in three-phase a.c. systems - Part 0: Calculation of currents	EN 60909-0	-
IEC 60949	-	Calculation of thermally permissible short-circuit currents, taking into account non-adiabatic heating effects	-	-
IEC 60986	-	Short-circuit temperature limits of electric cables with rated voltages from 6 kV (U_m = 7,2 kV) up to 30 kV (U_m = 36 kV)	-	-
IEC 61660-2	-	Short-circuit currents in d.c. auxiliary installations in power plants and substations - Part 2: Calculation of effects	EN 61660-2	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SHORT-CIRCUIT CURRENTS – CALCULATION OF EFFECTS –

Part 1: Definitions and calculation methods

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.
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International Standard IEC 60865-1 has been prepared by IEC technical committee 73: Short-circuit currents.

This third edition cancels and replaces the second edition published in 1993. This edition constitutes a technical revision.

The main changes with respect to the previous edition are listed below:

- The determinations for automatic reclosure together with rigid conductors have been revised.
- The influence of mid-span droppers to the span has been included.
- For vertical cable-connection the displacement and the tensile force onto the lower fixing point may now be calculated.
- Additional recommendations for foundation loads due to tensile forces have been added.

- The subclause for determination of the thermal equivalent short-circuits current has been deleted (it is now part of IEC 60909-0).
- The regulations for thermal effects of electrical equipment have been deleted.
- The standard has been reorganized and some of the symbols have been changed to follow the conceptual characteristic of international standards.

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

CDV	Report on voting
73/152/CDV	73/153/RVC

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.

A list of all parts of the IEC 60865 series, under the general title, *Short-circuit currents – Calculation of effects* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site 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
- amended.

SHORT-CIRCUIT CURRENTS – CALCULATION OF EFFECTS –

Part 1: Definitions and calculation methods

1 Scope

This part of IEC 60865 is applicable to the mechanical and thermal effects of short-circuit currents. It contains procedures for the calculation of

– the electromagnetic effect on rigid conductors and flexible conductors,

– the thermal effect on bare conductors.

For cables and insulated conductors, reference is made, for example, to IEC 60949 and IEC 60986. For the electromagnetic and thermal effects in d.c. auxiliary installations of power plants and substations reference is made to IEC 61660-2.

Only a.c. systems are dealt with in this standard.

The following points should, in particular, be noted:

a) The calculation of short-circuit currents should be based on IEC 60909. For the determination of the greatest possible short-circuit current, additional information from other IEC standards may be referred to, e.g. details about the underlying circuitry of the calculation or details about current-limiting devices, if this leads to a reduction of the mechanical stress.

b) Short-circuit duration used in this standard depends on the protection concept and should be considered in that sense.

c) These standardized procedures are adjusted to practical requirements and contain simplifications which are conservative. Testing or more detailed methods of calculation or both may be used.

d) In Clause 5 of this standard, for arrangements with rigid conductors, only the stresses caused by short-circuit currents are calculated. Furthermore, other stresses can exist, e.g. caused by dead-load, wind, ice, operating forces or earthquakes. The combination of these loads with the short-circuit loading should be part of an agreement and/or be given by standards, e.g. erection-codes.

   The tensile forces in arrangements with flexible conductors include the effects of dead-load. With respect to the combination of other loads the considerations given above are valid.

e) The calculated loads are design loads and should be used as exceptional loads without any additional partial safety factor according to installation codes of, for example, IEC 61936-1 [1][1].

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 60909 (all parts) *Short-circuit current calculation in three-phase a.c. systems*

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1 Figures in square brackets refer to the bibliography.