

This is a preview - click here to buy the full publication



IEC 62125

Edition 1.0 2019-09

INTERNATIONAL STANDARD



Environmental considerations specific to insulated electrical power and control cables

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.060.20

ISBN 978-2-8322-7374-6

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms, definitions and symbols.....	7
3.1 Terms and definitions.....	7
3.2 Symbols.....	9
4 General principles	11
5 Environmental checklist approach.....	11
5.1 What is the checklist approach?.....	11
5.2 Checklist.....	12
6 Life cycle assessment (LCA) of cables	12
6.1 General.....	12
6.2 Goal and scope.....	13
6.2.1 LCA study goal	13
6.2.2 Functional unit.....	13
6.2.3 Reference flow	14
6.2.4 System boundary.....	14
6.2.5 Cut-off criteria	15
6.2.6 Assumptions and limitations	15
6.3 Life cycle inventory (LCI)	15
6.3.1 General	15
6.3.2 Data collection.....	15
6.3.3 Data selection.....	16
6.3.4 Allocation procedure	16
6.4 Life cycle impact assessment (LCIA).....	16
6.5 Interpretation	17
6.6 Single environmental indicator approach.....	17
7 Environmental and energy cost-based conductor size optimization – ECSO	18
7.1 Overview.....	18
7.2 Basic rules.....	18
7.3 Factors	20
7.4 CO ₂ evaluation.....	20
7.4.1 General	20
7.4.2 CO ₂ emissions during manufacturing, transportation, installation and final disposal	20
7.4.3 CO ₂ emissions at the use phase	20
7.5 Calculation method	20
7.5.1 General	20
7.5.2 Calculation of initial cost.....	20
7.5.3 Calculation of running costs.....	21
7.5.4 Conductor resistance.....	21
7.5.5 Optimum current.....	21
7.5.6 Optimum conductor size	22
7.5.7 Energy reduction related to the use phase of the cable.....	22
7.6 Example.....	23

8	Environment-related communication	24
8.1	General.....	24
8.2	General principles.....	24
8.3	Composition and compliancy to legislation on substances.....	25
8.4	Life cycle assessment.....	25
8.5	End of life	25
Annex A	(informative) Checklist for the checklist approach	26
A.1	Preliminary considerations	26
A.2	Design considerations.....	26
A.3	Production considerations.....	26
A.4	Considerations for use and end of life phase.....	27
Annex B	(informative) Example for ECSO	28
B.1	General.....	28
B.2	Cable data	28
B.3	Calculation condition.....	28
B.4	Initial cost	29
B.4.1	Initial investment	29
B.4.2	Conversion of CO ₂ emissions during material/cable production, removal, transportation and disposal to cost	29
B.4.3	Initial cost (sum).....	29
B.4.4	Conductor resistance.....	30
B.5	Calculation of running costs	30
B.5.1	Costs for Joule losses during anticipated life time.....	30
B.5.2	Costs for CO ₂ emission during anticipated life time	30
B.6	Life cycle cost.....	31
B.7	Optimum current	31
B.8	Efficiency	32
B.8.1	Calculation of energy efficiency	32
B.9	Life cycle cost versus service life.....	33
Annex C	(informative) Example of environmental communication.....	34
Bibliography	35
Figure 1	– Life cycle phases	13
Figure 2	– Life cycle costs for conductor size for a certain current	19
Figure 3	– Optimum current range for minimizing life cycle cost.....	19
Table B.1	– Life cycle cost versus service life	33
Table B.2	– Life cycle cost versus service life, relative to 3C 70 mm ²	33

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL CONSIDERATIONS SPECIFIC TO INSULATED ELECTRICAL POWER AND CONTROL CABLES

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.
- 2) The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62125 has been prepared by IEC technical committee 20: Electric cables.

This first edition cancels and replaces IEC TR 62125, published in 2007. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC TR 62125:2007:

- a) development of the document from TR to international standard;
- b) inclusion of a methodology for LCA;
- c) inclusion of a methodology for conductor size optimization.

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

FDIS	Report on voting
20/1876/FDIS	20/1881/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.

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.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The cable sector has, for many years, considered the impact of electric cables on the environment with respect to their operating conditions. Transmission system operators, distribution system operators, manufacturers, installers/contractors, users and authorities have considerably increased their requirements to take into account the environmental impact of electric cables.

IEC TC 20 regularly reviews its approach to the incorporation of environmental aspects into standards for electric cables and their components. Environmental considerations should be included in both design and redesign work with respect to the raw materials used, energy consumption, emissions and generation of waste during production, end of life recycling or disposal, and in-service performance.

This document supersedes IEC TR 62125 published 2007, which intended to give assistance to writers of standards within IEC Technical Committee 20, to take into account the relevant environmental aspects that are specific to electric cables in normal use.

This document is addressed to writers of standards, manufacturers and users of power cables to provide guidance when evaluating:

- the qualitative environmental impact (checklist approach), or
- the quantitative environmental impact (LCA approach), and
- the environmental and energy cost-based conductor size optimization (ECSO).

ENVIRONMENTAL CONSIDERATIONS SPECIFIC TO INSULATED ELECTRICAL POWER AND CONTROL CABLES

1 Scope

This document provides methodologies addressing environmental evaluation and communication related to cables in normal use.

It includes an environmental checklist for power cables, the method for life cycle assessment (LCA) and a methodology for conductor size optimization.

The results obtained by applying such methodologies can be used for external communication. Environmental communication can also include other topics, such as material declaration.

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.

IEC 60287-3-2:2012, *Electric cables – Calculation of the current rating – Part 3-2: Sections on operating conditions – Economic optimization of power cable size*

ISO 14040:2006, *Environmental management – Life cycle assessment – Principles and framework*

ISO 14044:2006, *Environmental management – Life cycle assessment – Requirements and guidelines*