

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Electromechanical elementary relays –
Part 2-1: Reliability – Procedure for the verification of B_{10} values**

**Relais électromécaniques élémentaires –
Partie 2-1: Fiabilité – Procédure de vérification des valeurs de B_{10}**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTROMECHANICAL ELEMENTARY RELAYS –**Part 2-1: Reliability – Procedure for the verification of B_{10} values**

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International Standard IEC 61810-2-1 has been prepared by IEC technical committee 94: All-or-nothing electrical relays.

This second edition cancels and replaces the first edition published in 2011. This edition constitutes a technical revision.

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

- a) limitation of tests to 10 M cycles in Clause 5;
- b) reduction of required number of test samples to 5 in specified cases;
- c) introduction of WeiBayes analysis for routine test under Clause 4.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
94/416/FDIS	94/419/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This International Standard is to be used in conjunction with IEC 61810-2:2017.

A list of all parts in the IEC 61810 series, published under the general title *Electromechanical elementary relays*, 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 "<http://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- withdrawn,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.

INTRODUCTION

Based on the general provisions of IEC 61810-2, this part of IEC 61810 specifies reliability test procedures for electromechanical elementary relays where enhanced requirements for the verification of reliability apply. A type test is passed and then confirmed by routine tests with specified periodicity. This document describes how figures for B_{10} (the mean number of cycles until 10 % of the relays have failed) are derived from these life tests performed with representative relay samples.

In particular when electromechanical elementary relays are intended to be incorporated in safety-related control systems of machinery in accordance with IEC 62061 and ISO 13849-1, the mean time to dangerous failure ($MTTF_d$) is a measure that can be taken into account when assessing the probability of dangerous failure of the safety function concerned. Although a component failure cannot be defined as “dangerous” unless the detailed application is known, it is common to consider a failure mode that is likely to result in danger in a typical application of the component, and to refer to this failure mode as a “dangerous failure”. The $MTTF_d$ then becomes the expectation of the mean time to failure in this “dangerous” mode. For the calculation of $MTTF_d$ for electromechanical relays, the data provided by the manufacturer for B_{10D} can be used (see Clause C.4 of ISO 13849-1:2015).

Electromechanical elementary relays with forcibly guided (mechanically linked) contacts offer the possibility of a high diagnostic coverage according to 4.5.3 of ISO 13849-1:2015.

NOTE Requirements for such relays are given in IEC 61810-3.

ELECTROMECHANICAL ELEMENTARY RELAYS –

Part 2-1: Reliability – Procedure for the verification of B_{10} values

1 Scope

This part of IEC 61810 specifies reliability test procedures for electromechanical elementary relays when enhanced requirements for the verification of reliability apply.

Particular provisions are given for relays incorporated in safety-related control systems of machinery in accordance with IEC 62061 and ISO 13849-1. For such relays, B_{10} values for dangerous failures (B_{10D} values) are derived from the tests specified in this document.

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 61810-1:2015, *Electromechanical elementary relays – Part 1: General and safety requirements*

IEC 61810-2:2017, *Electromechanical elementary relays – Part 2: Reliability*

IEC 61810-3, *Electromechanical elementary relays – Part 3: Relays with forcibly guided (mechanically linked) contacts*

IEC 62061, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

ISO 13849-1:2015 *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61810-2 and the following 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>

3.1

dangerous failure

failure which has the potential to put the safety-related part of a control system in a hazardous or fail-to-function state

[SOURCE: ISO 13849-1:2015, 3.1.5, modified – In the definition, the abbreviated term "SRP/CS" has been replaced by "safety-related part of a control system".]