



**SLOVENSKI STANDARD**  
**oSIST prEN 2350:2023**  
**01-maj-2023**

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**Aeronavtika - Odklopniki - Tehnična specifikacija**

Aerospace series - Circuit breakers - Technical specification

Luft- und Raumfahrt - Schutzschalter - Technische Lieferbedingungen

Série aérospatiale - Disjoncteurs - Spécification technique

**Ta slovenski standard je istoveten z: prEN 2350**

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**ICS:**

49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems
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**oSIST prEN 2350:2023**

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NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 2350**

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ICS 49.060

Will supersede EN 2350:1990

English Version

## Aerospace series - Circuit breakers - Technical specification

Série aérospatiale - Disjoncteurs - Spécification technique

Luft- und Raumfahrt - Schutzschalter - Technische Lieferbedingungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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**prEN 2350:2023 (E)**

## **European foreword**

This document (prEN 2350:2023) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 2350:1990.

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## 1 Scope

This document gives design information and specifies test methods for aircraft circuit breakers covered by European Standards. It is applicable if it is referred to in these standards.

## 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.

ISO 2669, *Environmental tests for aircraft equipment — Steady-state acceleration*

ISO 7137, *Aircraft — Environmental conditions and test procedures for airborne equipment*

IEC 60050-441, *International electrotechnical vocabulary — Switchgear, controlgear and fuses*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-441 and the following apply.

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

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1

#### **circuit breaker with “trip-free release”**

circuit breaker in which the “open” command takes precedence over the “close” command, i.e. when the electrical trip condition is reached and pressure is exerted on the depressed actuator button, the circuit is still automatically opened

### 3.2

#### **poles of a circuit breaker**

denotes any main circuit from the input to the pertinent output terminal

Note 1 to entry: the parts of each current path (contact, sensors, switching parts) are independent and electrically insulated.

Note 2 to entry: there may be 1, 2 or 3 poles independently of any auxiliary circuits.

### 3.3

#### **current rating ( $I_n$ )**

current in amperes for which the circuit breaker has been designed and designated

Note 1 to entry: trip characteristics and test values are based on the current rating.

### 3.4

#### **voltage ratings**

voltage levels in volts for which the circuit breaker is designed

Note 1 to entry: insulation values and test voltages are related to these rated voltages.

**prEN 2350:2023 (E)****3.5****indication of current and voltage values**

unless otherwise specified, the a.c. voltage and a.c. values shown are r.m.s. values

**4 Design****4.1 Insulating housing**

In addition to the switching mechanism, the insulating housing shall incorporate the connecting and mounting systems.

**4.2 Trip-free mechanism**

The circuit breaker shall be designed to permit trip-free release, i.e. so that it is switched off at overload and remains switched off even when the button is held in the closed position. Resetting of the circuit breaker shall be possible only after complete release of the actuator button.

In no case shall operation under these conditions affect the further serviceability of the circuit breaker.

All poles of a multi-pole circuit breaker shall trip on single or multi-phase overload. The time lag between opening of the first and last pole shall not exceed 10 ms.

**4.3 Mounting**

All visible parts shall be black and non-reflective.

**4.4 Electrical connection components**

These shall be suitable to fit the cable lugs (or contacts).

**4.5 Actuator button**

In the closed position, the visible part of the actuator button shall be black. In the "off" (open) position, a white strip shall be exposed. The outer part of this button shall be insulated from all live parts.

In no case shall the actuator button remain in an intermediate position or give an incorrect indication of the switching condition of the circuit breaker. It shall not be removable.

- The circuit breaker contacts shall be closed by pushing the actuator button.
- The circuit breaker contacts shall be opened by pulling the actuator button.

The current rating of the circuit breaker shall be indicated indelibly in white colour on the top of the actuator button. Arrangement of the digits is indicated in the product standard.

**4.6 Calibration safety device**

The circuit breaker shall be designed in such a way that the calibration cannot be interfered with without breaking a seal.

**4.7 Leakage paths**

Leakage paths and the minimum distance to be observed between live parts and all other parts of the circuit breaker in non-insulating materials and between live parts of opposite polarity shall be sufficient to avoid damage and spark-over under all operating and ambient conditions.



## 4.8 Insulants

Insulating parts shall be of non-inflammable or self-extinguishing materials and shall not emit noxious or explosive vapours.

They shall be resistant to fungus growth and the effects of microorganisms.

Protective coatings and materials which may chip, crack or shatter shall not be used.

## 4.9 Protection against corrosion

All metal parts shall be either resistant to or protected against corrosion.

In case of contact between dissimilar metals, they shall be protected against electrochemical corrosion.

Where bimetals are used, any corrosion which may occur shall not affect the proper function of the circuit breaker.

## 4.10 Fasteners

Screws and nuts shall be locked so that the connections cannot be damaged.

# 5 Tests – Requirements – Procedures – Evaluation

## 5.1 General

5.1.1 Unless otherwise indicated, measurement conditions are as follows:

- ambient temperature ( $23 \pm 5$ ) °C;
- pressure 840 hPa to 1 070 hPa<sup>1</sup>;
- relative humidity  $\leq 85$  %.

5.1.2 Mechanical tests shall be carried out with the circuit breakers mounted in their normal position on a metal holder at least 2 mm thick.

5.1.3 For thermal tests the circuit breakers shall be mounted with the minimum distance between each other as specified in the product standard.

5.1.4 For electrical tests the circuit breakers shall be connected to cables as shown in Table 1.

The cables shall be at least 0,5 metre-long.

Where several circuit breakers or the poles of multi-pole circuit breakers are connected in series, the connecting cable between the circuit breakers or poles shall be 2 m  $\times$  0,5 m-long.

The cable lugs used shall be compatible with the circuit breaker terminals.

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<sup>1</sup> 1 hPa = 1 mbar.

Table 1

Current rating A	Cross section mm <sup>2</sup>	Corresponding AWG <sup>a</sup> Cross section
Up to 1	0,6	20
1.5 to 6	1	18
7 to 10	1,2	16
11 to 15	2	14
16 to 20	3	12
21 to 25	5	10
26 to 40	9	8
41 to 50	14	6

<sup>a</sup> AWG = American Wire Gauge.

## 5.2 Mechanical tests

### 5.2.1 Visual inspection

It shall be performed without magnification. It concerns:

- general appearance (surface finish, colour, assembly);
- conformity and quality of markings and inscriptions;
- undamaged condition of calibration seal;
- after climatic environmental tests, inspection of all parts which may show corrosion or poor legibility of the markings.

### 5.2.2 Dimensions and masses

These shall conform to the requirements of the product standard and shall be checked using normal measuring instruments.

### 5.2.3 Actuating components

#### 5.2.3.1 Actuator button travel

With the circuit breaker in the closed and open positions the dimensions of the end of the actuating button in relation to the mounting surface is measured, parallel to its longitudinal axis (direction of travel).

This measurement is performed three (3) times, with one (1) mechanical switching operation between each measurement.

The mean values of the measurements recorded shall lie within the tolerances specified in the product standard.

### 5.2.3.2 Operating force

The force required to switch “on” and “off” shall be measured with a suitable gauge in the line of travel of the actuator button.

The measurement shall be taken three (3) times in each direction.

The mean value of the measurements shall lie within the limits indicated in the product standard.

### 5.2.3.3 Strength of actuating components

#### — Transverse load

The push button in the closed and open position shall be subjected to the load specified in the product standard at the end (rim) of the button, perpendicularly to the direction of travel.

The load shall be applied for one (1) minute each in the four (4) main directions.

#### — Longitudinal load

The push button shall be subjected to the force specified in the product standard, for one (1) minute each in the push and pull directions.

No damage shall be caused by the loads applied.

#### — Evaluation

Verification tests A+ E + F + C of Table 5.

### 5.2.4 Strength of mounting

#### — Mounting

The tightening torque specified in the product standard shall be applied three (3) times for one (1) minute each, with one (1) disassembly between each operation.

#### — Rotation

The circuit breaker housing shall be turned around its mounting in both directions successively at the torque specified in the product standard.

No deformation outside tolerances or rupture of the locating device shall result. The circuit breaker housing shall not break.

#### — Evaluation

Verification tests: A+E + F + C of Table 5.