



SLOVENSKI STANDARD
oSIST prEN 3661-001:2023
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Aeronavtika - Odklopniki, enopolni, temperaturno kompenzirani, naznačeni tok od 20 A do 50 A - 001. del: Tehnična specifikacija

Aerospace series - Circuit breakers, single-pole, temperature compensated, rated currents 20 A to 50 A - Part 001: Technical specification

Luft- und Raumfahrt - Schutzschalter, einpolig, Temperaturkompensiert, Nennströme von 20 A bis 50 A - Teil 001: Technische Lieferbedingungen

Série aérospatiale - Disjoncteurs unipolaires compensés en température, intensités nominales 20 A à 50 A - Partie 001 : Spécification technique

Ta slovenski standard je istoveten z: prEN 3661-001

ICS:

49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems
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English Version

**Aerospace series - Circuit breakers, single-pole,
temperature compensated, rated currents 20 A to 50 A -
Part 001: Technical specification**

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compensés en température, intensités nominales 20 A
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Luft- und Raumfahrt - Schutzschalter, einpolig,
Temperaturkompensiert, Nennströme von 20 A bis 50
A - Teil 001: Technische Lieferbedingungen

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

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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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

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European foreword

This document (prEN 3661-001:2023) 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 3661-001:2006.

The main changes with respect to the previous edition are as follows:

- prEN 3661-001 (P3), 05/2005 — Editorial revision of this document: g_n replaced by g -PK for sinusoidal and low frequencies, g_n replaced by Grms for random.

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[oSIST prEN 3661-001:2023](https://standards.iteh.ai/catalog/standards/sist/3f841731-6999-4724-bc78-72ca1d2eca65/osist-pren-3661-001-2023)

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prEN 3661-001:2023 (E)**1 Scope**

This document specifies the single-pole temperature compensated circuit breakers with signal contacts, polarized or not, rated from 20 A to 50 A and used in aircraft on-board circuits. It describes specific environmental, electrical and mechanical characteristics and the stringency of tests to be applied according to test methods of EN 3841-100.

These circuit breakers are intended for use in aircraft with electrical supplies in accordance with EN 2282 (all categories).

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.

EN 2083, *Aerospace series — Copper and copper alloys conductors for electrical cables — Product standard*

EN 2825, *Aerospace series — Burning behaviour of non-metallic materials under the influence of radiating heat and flames — Determination of smoke density*

EN 2826, *Aerospace series — Burning behaviour of non-metallic materials under the influence of radiating heat and flames — Determination of gas components in the smoke*

EN 3841*, *Aerospace series — Circuit breakers — Test Methods*

EN 3844-1, *Aerospace series — Flammability of non-metallic materials — Part 1: Small burner test, vertical — Determination of the vertical flame propagation*

TR 6083, *Aerospace series — Cut-outs for installation of electrical components*¹

MIL-I-81969/1A, *Installing and removal tools, connector electrical contact, type III, class 2, composition C*²

MIL-I-81969/14C, *Installing and removal tools, connector electrical contact, type III, class 2, composition B*²

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 3841-100 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/>

* All parts quoted in this document.

¹ Published as ASD-STAN Technical Report at the date of publication of this document by AeroSpace and Defence industries Association of Europe — Standardization (ASD-STAN), <https://www.asd-stan.org/>.

² Published by: Department of Defense (DOD), the Pentagon, Washington D.C. 20301 USA.

4 Description

These circuit breakers are operated by a “push-pull” type single push button (actuator) and with delayed action “trip-free” tripping. Their function is ensured up to the short-circuit current.

5 Design

5.1 Materials

5.1.1 Metallic materials

All metallic parts shall be resistant to corrosion or finished against corrosion. When dissimilar materials are in close contact, an adequate protection against corrosion shall be used so that the electromotive force of the galvanic couple does not exceed 0,25 V.

When bimetals are used, an eventual corrosion shall not affect the good operation of the circuit breaker.

5.1.2 Insulation materials

The insulating parts shall be made of auto-extinguishing or non-flammable materials; they shall not emit damaging or explosive vapours, even in presence of fire or internal electric arc.

They shall be insensitive to moulds and microorganisms' action.

Application of any material or protective coating, which might crack, break or flake shall be forbidden.

Materials which are not specified, or which are not specially described shall be as light as possible for the requested use.

Materials shall be selected according to security criteria (toxicity, smoke density) as defined in contractual documents.

5.2 Design

5.2.1 Insulating box

The insulating box shall integrate besides the mechanism, the connection and attachment unit.

5.2.2 Free release mechanism

Design of circuit breaker mechanism shall allow free release, i.e. the circuit breaker cuts out in case of overload, and remains cut out even if the actuator is kept by force in engaged position.

A new engagement of circuit breaker is only possible after a first total release of the control actuator.

The operation in these conditions shall not affect further performances of the circuit breaker.

5.2.3 Attachment

All visible parts shall be black coloured and non-reflective.

5.2.4 Electrical connection units

They shall be able to receive the lugs (or contacts).

prEN 3661-001:2023 (E)**5.2.5 Control actuator**

In engaged position, the visible part of the control actuator shall be of the colour stated in the product standard. In disengaged (or opened) position, the control actuator shall show a white strip.

The outer part of this actuator shall be isolated from all undervoltage parts.

The control actuator shall not stay in a transition position or give a false indication about the circuit breaker condition. It shall not be removable.

When pushing it, power contacts of the circuit breaker engage and indicating contact opens.

When pulling it, power contacts of the circuit breaker open and indicating contact closes.

The circuit breaker rating is indicated in indelible white colour on the front part of the control actuator.

The product standard gives the digits positioning.

5.2.6 Rating inviolability

The circuit breaker shall be designed in such a way that the calibration unit cannot be reached without breaking a sealing.

5.2.7 Leakage lines

The leakage lines and the minimal space to be foreseen between the undervoltage parts and any other part of the circuit breaker made of non-insulating material, as well as between the undervoltage parts of opposite polarity, shall be sufficient to avoid any default or arc tracking in all uses and climatic conditions.

5.2.8 Protection against non-release

Electrical overload happening on a circuit breaker locked in its engaged position (sticked contacts or non-operating release mechanism), shall cause the opening of the circuit-by-circuit breaker destruction without any fire or important smoke release.

6 Characteristics**6.1 General characteristics**

See Table 1.

Table 1 — General characteristics

Designation	Requirements
Assembly	See product standard.
Mass	See product standard.
Operational altitude	See product standard.
Power contact connection	See product standard.
One input terminal on power supply side (identified by digit 1)	
One output terminal on distribution side (identified by digit 2)	
Signal contact connection, circuit closed when circuit breaker is on release	Crimp contacts size 20 See product standard.
Operational ambient temperatures limits	From -55 °C to 125 °C
Temperature compensation	From -55 °C to 125 °C See product standard.
Rating marking	On control actuator (indelible white)

6.2 Ratings

See product standard.

6.3 Nominal voltage of main contacts

See product standard.

6.4 Signal contact performances

See Table 2.

Table 2 — Signal contact performances

Signal contact	Type of load	28 VDC	5 VDC	5 VAC ^a	28 VDC
	Resistive	≤ 0,5 A	≥ 3 mA	Not used	≥ 3 mA
	Lamp	≤ 0,2 A	Not used	0,23 A	Not used

^a Applicable on version without diode only.

The circuit breaker status signalling function, open or closed shall be guaranteed after all the tests described in this specification.

NOTE In order to avoid any deterioration of the signalization circuit (contact and diode), the reception electrical test could be performed without exceeding the value recommended of 60 mW max. at 28 VDC max. (resistive load).

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6.5 Dimensional characteristics

See product standard.

6.6 Recommended panel mounting dimensions

Panel cut-out: The panel cut-out is in accordance with the designation TR 6083 C202.
 Spacing: 25 mm horizontal and 45 mm vertical from the centres of the mounting holes.
 Panel thickness: 1 mm to 3 mm.

7 Tests

7.1 Mechanical tests

See Table 3.

Table 3 — Mechanical tests

Tests				Requirements	
Visual check				See EN 3841-201.	
Operational force		Closing force (push)		See EN 3841-502.	8 N to 80 N
		Opening force (pull)			5 N to 45 N
Mechanical strength	Actuator	Travel		See EN 3841-501. For value, see product standard.	
		Transverse load		See EN 3841-503.	≥ 110 N
		Longitudinal load	Push		≥ 110 N
	Pull		≥ 110 N		
	Attachment nut	Tightening torque		See EN 3841-504.	≥ 5,5 N.m
		Rotation torque			≥ 3 N.m
	Main contact connection	Screw tightening torque		See EN 3841-505.	≥ 2,5 N.m
		Tensile force as per F_1 (see Figure 1 in product standard).			≥ 110 N
		Pressure force as per F_2 (see Figure 1 in product standard).			≥ 55 N
	Signal contact connection (size 20)	See product standard.			
		Insertion force Insertion possible without tools		See EN 3841-509.	≤ 6 N
		Extraction force			≤ 15 N
Contact retention force (pre-load 13,5 N)		See EN 3841-510.	≥ 67 N shift ≤ 0,3 mm		
Radial load		See EN 3841-510.	≥ 30 N		
Recommended tools: - plastic: MIL-I-81969/14-11 - metallic: MIL-I-81969/1-02		See MIL-I-81969/1A and MIL-I-81969/14C.			

7.2 Environmental tests

See Table 4.

Table 4 — Environmental conditions (1 of 2)

Tests		Requirements	
Combined tests Ambient temperature 70 °C and vibrations ^a	Sinusoidal (see Figure 1). Duration: <ul style="list-style-type: none"> - circuit breaker in the “closed” position: <ul style="list-style-type: none"> - 0,9 I_n load – 7 cycles/axis - 1 octave/min, - no load – 2 cycles/axis – 1 octave/min; - circuit breaker in the “opened” position: <ul style="list-style-type: none"> - 2 cycles/axis – 1 octave/min. 	See EN 3841-506.	5 Hz to 80 Hz - Constant amplitude $2 a = 0,76$ mm
			80 Hz to 500 Hz - Constant acceleration = 10 <i>g</i> - PK
			500 Hz to 2 000 Hz - Constant acceleration = 5 <i>g</i> -PK
	Random (see Figure 2). Duration: <ul style="list-style-type: none"> - circuit breaker in the “closed” position: <ul style="list-style-type: none"> - 0,9 I_n load – 15 min/axis, - no load – 15 min/axis; - circuit breaker in the “opened” position: <ul style="list-style-type: none"> - 15 min/axis. 		10 Hz to 2 000 Hz - Overall acceleration = 5,8 Grms
	Low frequencies (see Figure 3). Applicability: see product standard. Duration: <ul style="list-style-type: none"> - circuit breaker in the “closed” position: <ul style="list-style-type: none"> - 0,9 I_n load – 2 cycles/axis, - no load – 2 cycles/axis; - circuit breaker in the “opened” position: <ul style="list-style-type: none"> - 2 cycles/axis. 		10 Hz to 27 Hz to 10 Hz - Constant acceleration = 10 <i>g</i> - PK
			10 Hz to 5 Hz - Constant acceleration = 3,5 <i>g</i> - PK
Combined tests Ambient temperature 85 °C, cabin max. altitude 4 600 m and vibrations ^a	Sinusoidal - Applicability: see product standard. Duration: <ul style="list-style-type: none"> - circuit breaker in the “closed” position: <ul style="list-style-type: none"> - 0,9 I_n load – 4 cycles/axis - 1 octave/min, - no load – 2 cycles/axis - 1 octave/min; - circuit breaker in the “opened” position: <ul style="list-style-type: none"> - 2 cycles/axis – 1 octave/min. 	See EN 3841-511.	5 Hz to 54 Hz - Constant shift $2 a = 0,5$ mm