



SLOVENSKI STANDARD
oSIST prEN 3774-001:2023
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Aeronavtika - Odklopniki, tripolni, temperaturno kompenzirani, naznačeni tok od 1 A do 25 A - 001. del: Tehnična specifikacija

Aerospace series - Circuit breakers, three-pole, temperature compensated, rated currents 1 A to 25 A - Part 001: Technical specification

Luft- und Raumfahrt - Schutzschalter, dreipolig, temperaturkompensiert, Nennströme von 1 A bis 25 A - Teil 001: Technische Lieferbedingungen

Série aérospatiale - Disjoncteurs tripolaires compensés en température, intensités nominales 1 A à 25 A - Partie 001 : Spécification technique

Ta slovenski standard je istoveten z: prEN 3774-001

ICS:

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

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temperature compensated, rated currents 1 A to 25 A -
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temperaturkompensiert, Nennströme von 1 A bis 25 A
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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 3774-001:2023) 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 3774-001:2014.

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

- prEN 3774-001 (P2), 02/2012 — 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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prEN 3774-001:2023 (E)**1 Scope**

This document specifies the three-pole temperature compensated circuit breakers, rated from 1 A to 25 A 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.

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

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/>

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.

* 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/>.

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.

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.

When pulling it, power contacts of the circuit breaker open.

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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 Clearances and creepage distances

The clearances, creepage distances and the minimal space to be foreseen between the energized parts and any other part of the circuit breaker made of conductive material, as well as between the energized parts of opposite polarity, shall be sufficient to avoid any default or arcing 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.	
Three input terminals on power supply side (identified by digit A1, B1, C1)		See product standard.	
Three output terminals on distribution side (identified by digit A2, B2, C2)			
Operational ambient temperatures limits		From -55 °C to 125 °C	
Temperature compensation	Rating 1 A to 15 A	From -55 °C to 125 °C	See product standard.
	Rating 20 A and 25 A	From -55 °C to 90 °C	
Rating marking		On control actuator (indelible white)	

6.2 Ratings

See product standard.

6.3 Nominal voltage of operational circuits

See product standard.

6.4 Dimensional characteristics

See product standard.

6.5 Recommended panel mounting dimensions

Panel cut-out: The panel cut-out is in accordance with the designation TR 6083 C202.

Spacing: 50 mm horizontal and 30 mm vertical from the centre of the mounting holes.

Panel thickness: 1 mm to 3 mm.

7 Tests

7.1 Mechanical tests

See Table 2.

Table 2 — Mechanical characteristics

Tests			Requirements		
Visual check			EN 3841-201		
Operational force	Closing force (push)		EN 3841-502	8 N to 80 N	
	Opening force (pull)			5 N to 30 N	
Mechanical strength	Actuator	Travel		EN 3841-501 For value, see product standard.	
		Transverse load		≥ 110 N	
		Longitudinal load	Push	EN 3841-503	≥ 110 N
	Pull			≥ 110 N	
	Attachment nut	Tightening torque		EN 3841-504	≥ 5 N.m
		Rotation torque			≥ 3 N.m
	Main contact connection	Screw tightening torque			≥ 2 N.m
Tensile force as per F_1 (see Figure 1 in product standard).		EN 3841-505	≥ 110 N		
Pressure force as per F_2 (see Figure 1 in product standard).			≥ 55 N		

7.2 Environmental tests

See Table 3.

Table 3 — Environmental conditions (1 of 2)

Tests		Requirements	
Combined tests. Ambient temperature 70 °C and vibrations ^a .	Sinusoidal (see Figure 1). Duration: — circuit breaker in the “closed” position: — 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: — 2 cycles/axis - 1 octave/min.		5 Hz to 80 Hz - Constant amplitude 2 a = 0,76 mm
			80 Hz to 500 Hz - Constant acceleration = 10 g- PK
			500 Hz to 2 000 Hz - Constant acceleration = 5 g-PK
	Random (see Figure 2). Duration: — circuit breaker in the “closed” position: — 0,9 I_n load - 15 min/axis, — no load - 15 min/axis; — circuit breaker in the “opened” position: — 15 min/axis.	See EN 3841-506.	10 Hz to 2 000 Hz - Overall acceleration = 5,8 Grms
	Low frequencies (see Figure 3). Applicability: see product standard. Duration: — circuit breaker in the “closed” position: — 0,9 I_n load - 2 cycles/axis, — no load - 2 cycles/axis; — circuit breaker in the “opened” position: — 2 cycles/axis.		10 Hz to 27 Hz to 10 Hz - Constant acceleration = 10 g- PK
			10 Hz to 5 Hz - Constant acceleration = 3,5 g- PK

Table 3 — Environmental conditions (2 of 2)

Tests		Requirements	
Combined tests Ambient temperature 85 °C, cabin max. altitude 4 600 m and vibrations ^a .	Sinusoidal – Applicability: see product standard. Duration:	See EN 3841-511.	5 Hz to 54 Hz – Constant shift 2 a = 0,5 mm
	— circuit breaker in the “closed” position: — 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: — 2 cycles/axis – 1 octave/min.		54 Hz to 2 000 Hz – Constant acceleration = 3 g-PK
Mechanical shocks ^a		50 g-PK – 11 ms – Half sine wave See EN 3841-507.	
Constant accelerations		See product standard.	
Sand and dust		See product standard.	
Corrosion (salt spray)		See EN 3841-402, category S.	
Humidity		See EN 3841-403, category A.	
Explosion-proofing		See product standard.	
Contaminating liquids		Cleaning and extinguishing products See EN 3841-405.	
Flammability (glow wire test)		See EN 3841-406.	
Inflammability		See test EN 3844-1, code B.	
Smoke density		See test EN 2825, code A or code B.	
Toxicity		See test EN 2826, code B.	
Overvoltage caused by lightning only on main contacts		See EN 3841-308. Requirement: no tripping	
<p>^a Vibration tests performed on circuit breakers in closed position without load and in opened position, are carried out in order to detect contact opening and closure.</p> <p>For vibration and shock tests, the contact-opening or contact-closure shall be less than or equal to 10 µs on the power and the signal contacts.</p> <p>Shock tests are performed one on each way for each of the three directions (i.e., 6 shocks in all).</p> <p>Circuit breaker in the closed position = main contacts closed. Circuit breaker in the opened position = main contacts opened.</p> <p>Any additional vibration testing (e.g., sustained engine imbalance) shall be contractually agreed between users and manufacturers.</p>			