

BS ISO 10924-3:2015



BSI Standards Publication

Road vehicles — Circuit breakers

Part 3: Miniature circuit breakers with tabs
(Blade type), Form CB11

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National foreword

This British Standard is the UK implementation of ISO 10924-3:2015.

The UK participation in its preparation was entrusted to Technical Committee AUE/32, Electrical and electronic components and general system aspects (Road vehicles).

A list of organizations represented on this committee can be obtained on request to its secretary.

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ISBN 978 0 580 77252 8

ICS 43.040.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2015.

Amendments issued since publication

Date	Text affected
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Road vehicles — Circuit breakers —
Part 3:
Miniature circuit breakers with tabs
(Blade type), Form CB11

Véhicules routier — Coupe circuits —

*Partie 3: Coupe circuits miniatures avec languette (type languette),
Forme CB11*





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Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Marking, labelling, and colour coding	1
5 Tests and requirements	2
5.1 General.....	2
5.1.1 General test conditions.....	2
5.1.2 Test sequence plan.....	2
5.1.3 Test cable sizes.....	3
5.2 Voltage drop.....	4
5.2.1 Purpose.....	4
5.2.2 Tests.....	4
5.2.3 Requirements.....	4
5.3 Maximum housing temperature.....	4
5.4 Environmental conditions.....	4
5.5 Operating time-rating.....	4
5.5.1 Purpose.....	4
5.5.2 Tests.....	4
5.5.3 Requirements.....	4
5.6 Current steps.....	5
5.7 No current trip and reset temperature.....	5
5.8 Absolute breaking capacity.....	5
5.8.1 Tests.....	5
5.8.2 Requirements.....	5
5.9 Breaking capacity.....	5
5.9.1 Tests.....	5
5.9.2 Requirements.....	6
5.10 Strength of terminals.....	6
5.11 Endurance.....	6
5.11.1 Tests.....	6
5.11.2 Requirements.....	6
5.12 Dielectric strength.....	7
5.12.1 Tests.....	7
5.12.2 Requirement.....	7
6 Dimensions and designation examples	7
6.1 Dimensions.....	7
6.2 Designation examples.....	7
6.2.1 Category B.....	7
6.2.2 Category C.....	8
6.2.3 Category D.....	8
6.2.4 Category F and G.....	9
6.2.5 Category H.....	9
Bibliography	11

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electric and electronic equipment*.

ISO 10924 consists of the following parts, under the general title *Road vehicles — Circuit breakers*:

- *Part 1: Definitions and general test requirements*
- *Part 2: User's guide*
- *Part 3: Miniature circuit breakers with tabs (Blade type), Form CB11*
- *Part 4: Medium circuit breakers with tabs (Blade type), Form CB15*
- *Part 5: Circuit breakers with tabs with rated voltage of 450 V*

Road vehicles — Circuit breakers —

Part 3:

Miniature circuit breakers with tabs (Blade type), Form CB11

1 Scope

This part of ISO 10924 specifies miniature circuit breakers with tabs (blade-type), Form CB11 for use in road vehicles. It establishes, for this circuit breaker form, the rated current, test procedures, performance requirements and dimensions.

This part of ISO 10924 is intended to be used in conjunction with ISO 10924-1 and with ISO 10924-2. The numbering of its clauses corresponds to that of ISO 10924-1 whose requirements are applicable, except where modified by requirements particular to this part of ISO 10924.

This part of ISO 10924 is applicable to circuit breakers with a rated voltage of 14 V and/or 28 V, a current rating of ≤ 30 A and a breaking capacity of 2 000 A intended for use in road vehicles with a nominal voltage of 12 V and/or 24 V.

The circuit breakers are different in dimensions and functions, such as electrically reset, automatic reset, manual reset, and switchable.

NOTE This type of circuit breaker is intended to be used in similar applications as miniature fuse-links according to ISO 8820-3. While the tab dimensions and current ratings can be the same, there might be differences in performance which the user of these products is advised to consider.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6722-1, *Road vehicles — 60 V and 600 V single-core cables — Part 1: Dimensions, test methods and requirements for copper conductor cables*

ISO 8820-3, *Road vehicles — Fuse-links — Part 3: Fuse-links with tabs (blade type) Type C (medium), Type E (high current) and Type F (miniature)*

ISO 10924-1, *Road vehicles — Circuit breakers — Part 1: Definitions and general test requirements*

ISO 16750-4, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 4: Climatic loads*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10924-1 apply.

4 Marking, labelling, and colour coding

See ISO 10924-1 and [Table 1](#).

Table 1 — Colour code

Rated current I_R A	Colour code
5	Tan/Light brown
7,5	Brown
10	Red
15	Blue
20	Yellow
25	White
30	Green

5 Tests and requirements

5.1 General

5.1.1 General test conditions

In addition to carrying out the test procedures in accordance with ISO 10924-1, the following criteria shall apply.

- Tests shall be performed following the test sequences in [Table 2](#).
- The test fixture for electrical tests shall be designed in accordance with Type F as shown in ISO 8820-3. The connection resistance shall be 0,8 mΩ max to ensure the proper function of the test fixture.
- The ambient temperature range for circuit breakers according to this part of ISO 10924 shall be: (–40 to 85) °C, Code G (according to ISO 16750-4).

5.1.2 Test sequence plan

Table 2 — Test sequence plan

No	Test	Clause	Sample groups ^a						
			1	2	3	4	5	6	7
1	Dimensions	6	X	X	X	–	–	–	–
2	Marking, labelling and colour coding	4	X	X	X	X	X	X	X
3	Operating time rating $2,0 I_R$	5.5	X	X	X	X	X	X	X
4	Current steps	5.6	–	–	–	–	X	–	–
5	Voltage drop	5.2	X	X	X	X	X	X	X
6	Maximum housing temperature	5.3	–	–	–	X	–	–	–
7	No current trip and reset temperature	5.7	–	–	–	–	X	–	–
8	Strength of terminals	5.10	X	X	X	–	–	–	–

NOTE “–” means not required.

^a Five circuit breakers for each rated current rating per sample group.

Table 2 (continued)

No	Test		Clause	Sample groups ^a								
				1	2	3	4	5	6	7		
9	Environmental conditions	Climatic loads		5.4	-	-	-	X	-	-	-	
10		Chemical loads			-	-	-	-	X	-	-	
11		Mechanical loads	Vibration		-	-	-	-	-	X	-	
			Shock		-	-	-	-	-	X	-	
	Free Fall		-	-	-	-	-	X	-			
12	Absolute breaking capacity		5.8	X	-	-	-	-	-	-		
13	Breaking capacity		5.9	-	X	-	-	-	-	-		
14	Endurance		5.11	-	-	X	X	-	X	-		
15	Operating time rating	0,7 I _R		5.5	-	X	X	-	-	-	X	
		1,1 I _R			-	-	-	X	-	X	X	
		1,35 I _R			-	-	-	X	-	X	X	
		1,6 I _R			-	-	-	-	-	-	-	X
		2,0 I _R			-	X	X	X	X	X	X	X
		3,5 I _R			-	-	-	-	-	-	-	X
		6,0 I _R			-	X	-	X	-	X	X	X
16	Voltage drop		5.2	-	X	X	X	X	X	X		
17	Maximum housing temperature		5.3	-	-	-	X	-	-	-		
18	Dielectric strength		5.12	X	X	X	X	X	X	-		
19	Strength of terminals		5.10	X	X	X	X	X	X	X		
20	Marking, labelling and colour coding		4	X	X	X	X	X	X	X		
NOTE “-” means not required.												
^a Five circuit breakers for each rated current rating per sample group.												

5.1.3 Test cable sizes

Test cable sizes shall be as given in Table 3. All tests for a particular circuit breaker rating shall be performed using the same cable size.

Test cable sizes are specified to allow comparative circuit breaker tests to be carried out. The cable size specified herein does not necessarily indicate the size of cable to be used in the vehicle application.

Table 3 — Test cable sizes

Rated current I _R A	Conductor cross-sectional area ^a mm ²	Length mm
5	0,50	500 ± 50
7,5	0,75	
10	1,0	
15	1,5	
20	2,5	
25		
30	4,0	

^a Conductor material according to ISO 6722-1.

5.2 Voltage drop

5.2.1 Purpose

See ISO 10924-1.

5.2.2 Tests

The circuit breaker voltage drop shall be measured at points A and B across the circuit breaker tabs at $0,7 I_R$ as shown in ISO 8820-3.

5.2.3 Requirements

The requirements given in [Table 4](#) shall apply.

Table 4 — Voltage drop

Rated current I_R A	max. voltage drop U_D mV
5	200
7,5	150
10	
15	
20	130
25	
30	120

5.3 Maximum housing temperature

The tests and requirements specified in ISO 10924-1 shall apply. The subsequent tests in [Table 2](#) shall be passed.

5.4 Environmental conditions

The tests of ISO 10924-1 shall apply.

5.5 Operating time-rating

5.5.1 Purpose

See ISO 10924-1.

5.5.2 Tests

The test of ISO 10924-1 shall apply.

5.5.3 Requirements

The requirements given in [Table 5](#) shall apply.

Table 5 — Operating times

Test current A	Operating time s					
	Category					
	B C D				F G H	
	Fast ^b		Standard			
	min.	max.	min.	max.	min.	max.
0,7 I_R	3 600	∞	3 600	∞	3 600	∞
I_R	9,0	∞	3 600	∞	3 600	∞
1,1 I_R	6,0	500	40	3 600	60	∞
1,35 I_R	3,0	74	12	1 800	45	1 800
1,6 I_R	1,9	37	6,0	170	20	200
2 I_R	1,1	18	3,0	40	5	60
3,5 I_R	0,3	3,9	0,8	6,0	0	5,0
6 I_R^a	0,1	1,1	0,2	1,6	0	2,0

^a If the rated breaking capacity is lower than the test current, the value of the rated breaking capacity is valid.
^b Operating time similar to fuse Type.

5.6 Current steps

The test and requirements of ISO 10924-1 shall apply.

5.7 No current trip and reset temperature

The test and requirements of ISO 10924-1 shall apply.

5.8 Absolute breaking capacity

5.8.1 Tests

The tests as described in ISO 10924-1 shall apply. The circuit breakers shall be tested at 2 000 A.

5.8.2 Requirements

The requirements as in ISO 10924-1 shall apply.

5.9 Breaking capacity

5.9.1 Tests

The tests given in ISO 10924-1 shall apply. The circuit breakers in accordance with this part of ISO 10924 shall be tested to the values specified in [Table 6](#), for a nominal voltage, U_N of 12 V or 24 V.

Table 6 — Breaking capacity

Current rating	U_N	
	12 V	24 V
≥5 A to ≤10 A	150 A	100 A
>10 A to ≤15 A	225 A	150 A
>15 A to ≤20 A	300 A	200 A
>20 A to ≤30 A	450 A	300 A

5.9.2 Requirements

The requirements of [Table 2](#) and the tests specified in ISO 10924-1 shall apply.

5.10 Strength of terminals

The test and requirements as given in ISO 8820-3 for Type F (miniature) fuse-links shall apply.

5.11 Endurance

5.11.1 Tests

The tests and cycling profiles as given in ISO 10924-1 shall apply; the minimum number of cycles is shown in [Table 7](#).

Table 7 — Endurance

Function	Type	Test current A	Cycles ^a					
			Category					
			B	C	D	F	G	H
Automatic reset	I	4,0 I_R	-	-	≥50 ^b	≥50 ^b	-	-
Electrically reset	II	4,0 I_R	-	-	30 + 30 ^c	-	30 + 30 ^c	-
Manual reset	III	4,0 I_R	100	100	-	-	-	100
Switchable	IV	1,0 I_R	50 + 250 ^d	-	-	-	-	-

NOTE “-” means not required.

^a Cycles for type II, type III, and type IV circuit breakers. Minutes for type I circuit breakers. See ISO 10924-1.

^b Circuit breaker shall be cycled for 30 min, the minimum number of cycles shall be 50. Following the 30 min of cycling, perform a voltage drop test (see ISO 10924-1). After the voltage drop test cycle, the circuit breaker for additional 4 h. It shall be acceptable, if the results of the endurance test are such, that the device is rendered inoperable, but is otherwise intact as described in the appropriate part of this International Standard.

^c After the first 30 cycles, allow the circuit breaker to cool down to re-close the circuit and repeat the test for another 30 cycles (see ISO 10924-1).

^d After the first 50 electrical loaded cycles with I_R , add 250 mechanical cycles.

5.11.2 Requirements

See ISO 10924-1

5.12 Dielectric strength

5.12.1 Tests

The circuit breaker shall be measured in OFF-position at points A and B as shown in ISO 8820-3. The test voltage amounts to $(500 \pm 10) \text{ V}$ for $(60_0^{+6}) \text{ s}$.

5.12.2 Requirement

For types I, III, and IV, flashover shall not occur and the leakage current shall not exceed 15 mA. Type II is not applicable.

6 Dimensions and designation examples

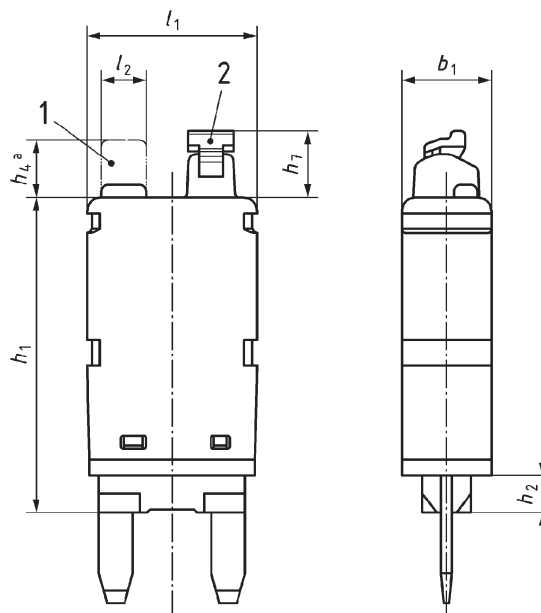
6.1 Dimensions

See [Table 8](#). For all not specified tab dimensions, ISO 8820-3, Type F (miniature fuse-links) shall apply.

All mounting dimensions as specified in the [Figure 1](#) to [5](#) shall apply. Other dimensions may be defined by the supplier.

6.2 Designation examples

6.2.1 Category B

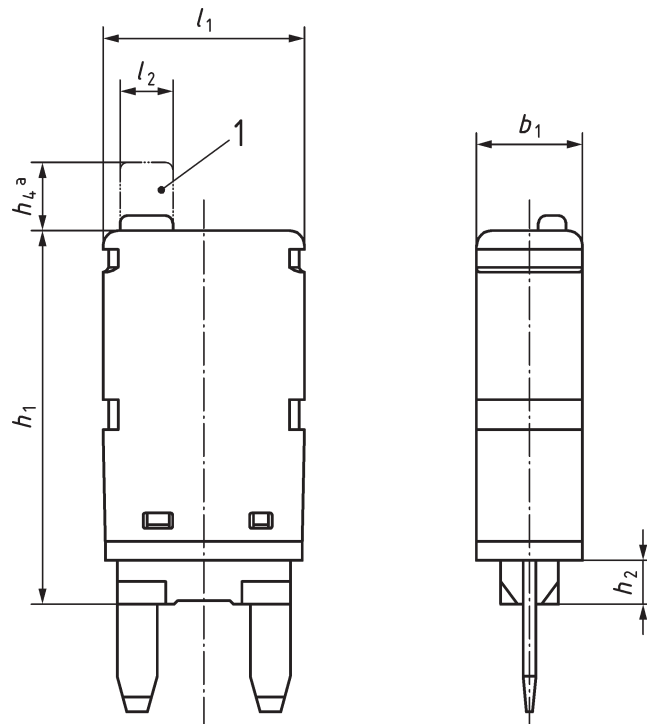


Key

- 1 space for button
- 2 direction for movement of switchable lever
- a "OFF" position is up; "ON" position is down.

Figure 1 — Circuit breaker — Category B

6.2.2 Category C



Key

- 1 space for button
- a "OFF" position is up; "ON" position is down.

Figure 2 — Circuit breaker — Category C

6.2.3 Category D

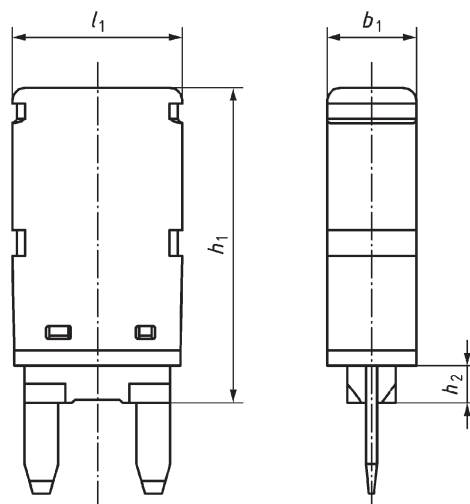


Figure 3 — Circuit breaker — Category D

6.2.4 Category F and G

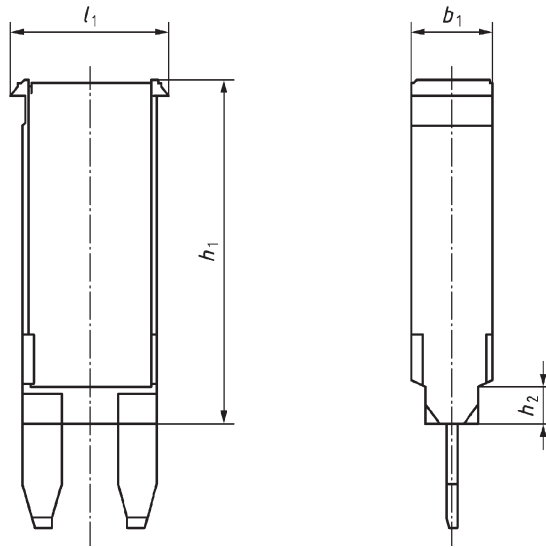
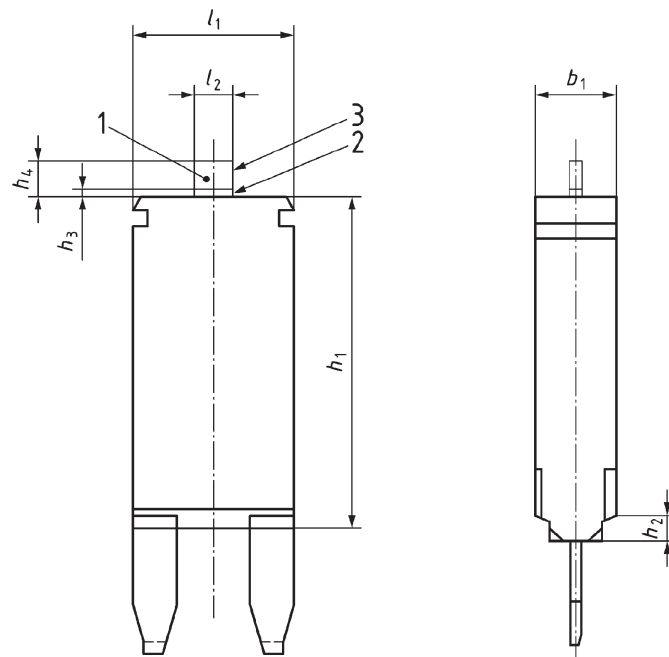


Figure 4 — Circuit breaker — Category F, G

6.2.5 Category H



Key

- 1 space for button
- 2 "ON" position
- 3 "OFF" position

Figure 5 — Circuit breaker — Category H

Table 8 — Dimensions

Dimensions in millimetres

Dimensions	Category						Tolerances
	B	C	D	F	G	H	
b ₁	7	7	7	6,5		6,4	±0,3
h ₁	25	25	25	27		26	±0,5
h ₂	2,9	2,9	2,9	2,9		1,5	±0,2
h ₃	-	-	-	-		0,6	±0,5
h ₄	4,5	4,5	-	-		2,8	±0,5
h ₇	5,2	-	-	-		-	±0,5
l ₁	13,3	13,3	13,3	12,4		12,6	±0,3
l ₂	3,5	3,5	-	-		3	±0,2

NOTE “-” means not required.

Bibliography

- [1] SAE J553¹⁾, *Circuit Breaker*

1) To be published.

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