INTERNATIONAL STANDARD

ISO 10924-3

First edition
2015-04-01

Road vehicles — Circuit breakers —

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

Véhicules routier — Coupe circuites —

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

Reference number
ISO 10924-3:2015(E)

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Published in Switzerland

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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
			3,5 I_R		–	–	–	–	–	–	X
			6,0 I_R		–	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] mm²	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.