
Road vehicles — Fuse-links —

Part 4:

**Fuse-links with female contacts (type A)
and bolt-in contacts (type B) and their test
fixtures**

Véhicules routiers — Liaisons fusibles électriques —

*Partie 4: Liaisons fusibles électriques avec contacts femelles (type A) et
contacts boulonnés (type B) et leurs montages d'essai*



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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 8820 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 8820-4 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 8820 consists of the following parts, under the general title *Road vehicles — Fuse-links*:

- *Part 1: Definitions and general test requirements*
- *Part 3: Fuse-links with tabs (blade type)*
- *Part 4: Fuse-links with female contacts (type A) and bolt-in contacts (type B) and their test fixtures*

The following parts are under preparation:

- *Part 2: User's guide*
- *Part 5: Strip fuse-links (type SF 30 and SF 51 and test fixtures)*

Road vehicles — Fuse-links —

Part 4:

Fuse-links with female contacts (type A) and bolt-in contacts (type B) and their test fixtures

1 Scope

This part of ISO 8820 specifies low-voltage fuse-links with female (type A) and bolt-in (type B) contacts for fuses in road vehicles. It establishes, for these fuse-link types, the rated current, test procedures, performance requirements, dimensions and test fixtures.

This part of ISO 8820 is applicable to those fuse-links with a rated voltage of 32 V, a current rating of 120 A and a breaking capacity of 1 000 A, intended for use in road vehicles at a nominal voltage of 12 V or 24 V.

This part of ISO 8820 is intended to be used in conjunction with ISO 8820-1, to which the numbering of its clauses corresponds. The requirements of ISO 8820-1 are applicable, except where modified by requirements particular to this part of ISO 8820.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 8820. For dated references, subsequent amendments to, or revisions of, this publication do not apply. However, parties to agreements based on this part of ISO 8820 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 8820-1:—¹⁾, *Road vehicles — Fuse-links — Part 1: Definitions and general test requirements*

3 Terms and definitions

For the purposes of this part of ISO 8820, the terms and definitions given in ISO 8820-1 apply.

4 Rated current and identification

The rated current and identification shall be in accordance with Table 1.

1) To be published. (Revision of ISO 8820-1:1994)

Table 1 — Classification

Fuse-link rating A	Fuse-links with female contacts			Fuse-links with bolt-in contacts	
	Terminal type			Terminal type	
	A1 6,3 × 0,8	A2 8,0 × 0,8	A3 9,5 × 1,2	B1 vertical type	B2 horizontal type
20	X	—	—	—	—
30	X	X	—	—	—
40	X	X	—	—	—
50	—	X	X	X	X
60	—	X	X	X	X
70	—	—	X	X	X
80	—	—	X	X	X
100	—	—	—	X	X
120	—	—	—	X	X

5 Test procedures

5.1 General

5.1.1 Criteria

In addition to carrying out the test procedures in accordance with clause 5 of ISO 8820-1:—¹⁾ the following criteria shall be observed.

The test fixtures (see annex A) shall be designed in accordance with Figure 1 and shall meet the interface voltage requirements specified in 5.1.2 and 5.1.3.

NOTE The terms ($U_{cd} - U_{ab}$) and (U_{ef}) in 5.1.2 and 5.1.3 refer to the measuring points a, b, c, d, e, f in Figure 1.

5.1.2 Fuse-links with female contacts A1, A2, A3

The interface voltage drop $U_{cd} - U_{ab}$ shall not exceed 2 mV/A and the total voltage drop U_{ef} shall not exceed 4 mV/A.

5.1.3 Fuse-links with bolt-in contacts B1 and contact B2

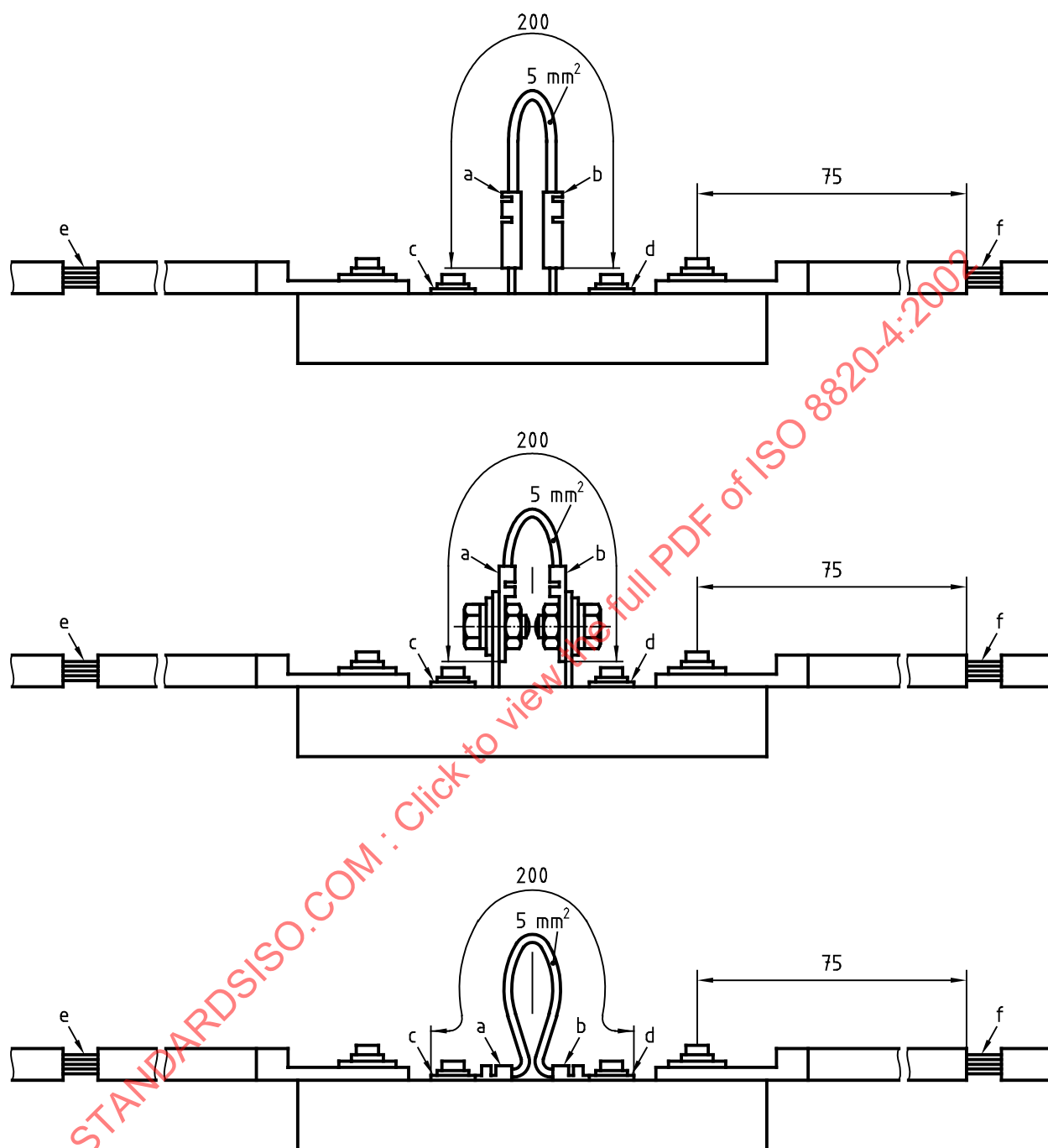
The interface voltage drop $U_{cd} - U_{ab}$ shall not exceed 1 mV/A and the total voltage drop U_{ef} shall not exceed 2 mV/A.

The interface voltage drop measurement shall be made using a shorting link as specified in Figure 1. The current of 10 A is used for this measurement.

5.2 Voltage drop

The voltage drop shall be measured at the voltage drop measuring point in accordance with annex A.

Dimensions in millimetres

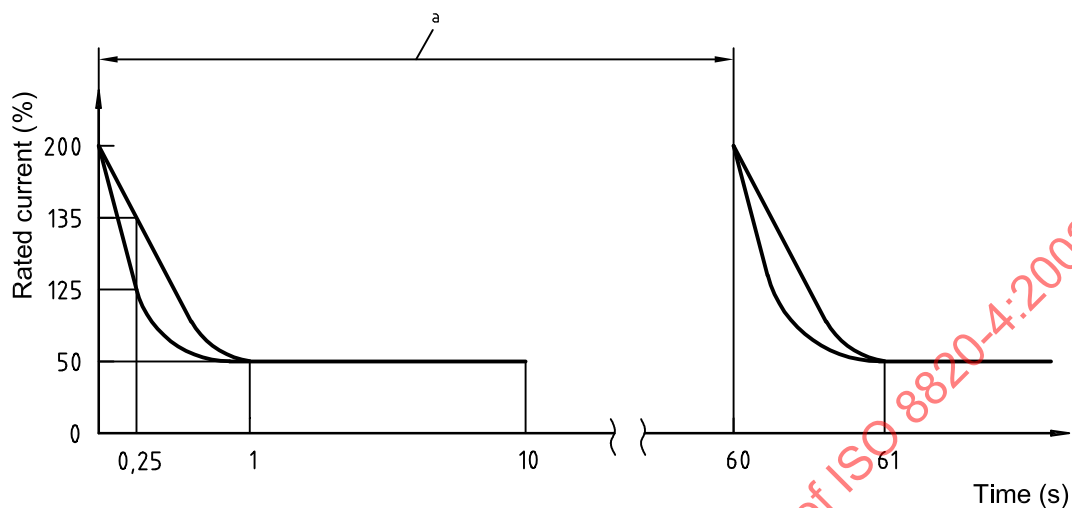
**Key**

a, b, c, d, e, f Measuring points

Figure 1 — Test setup

5.3 Transient current cycling

At an elapsed time of 0,25 s on-time, the current shall fall between 125 % and 135 % of rated current. At no time shall the steady state current fall below 45 % I_N . See Figure 2.



^a One cycle.

Figure 2 — Transient current cycling

5.4 Vibration

See ISO 8820-1.

5.5 Environmental exposure

See ISO 8820-1.

5.6 Operating time rating

See ISO 8820-1.

5.7 Current steps

See ISO 8820-1.

5.8 Breaking capacity

See ISO 8820-1.

Test cable sizes shall be as shown in Table 2.

Table 2 — Test cable sizes

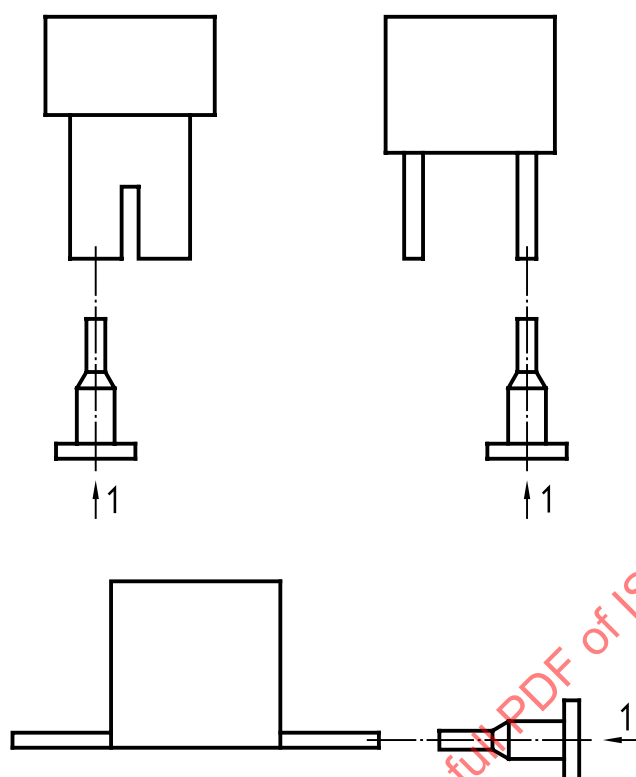
Fuse-link rating A	Conductor cross-sectional area mm ² ^a
20	4,0 to 5,0
30	
40	
50	5,0 to 6,0
60	
70	
80	8,0 to 10,0
100	
120	
All tests for a particular ampere rating shall be performed using the same cable size.	
NOTE Test cable sizes are specified to allow comparative fuse-link tests to be carried out. The cable size specified does not necessarily indicate the size of cable to be used in the vehicle application.	
^a Copper material.	

5.9 Strength of terminals

The appropriate force, as specified in Table 3, shall be applied to the terminals of the fuse-link as shown in Figure 3.

Table 3 — Forces

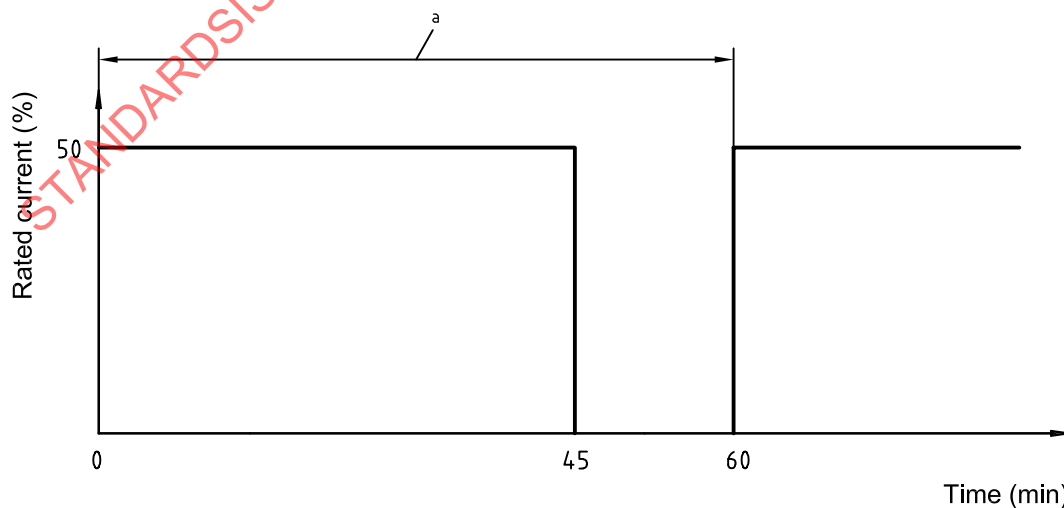
Fuse-link type	Force N
A 1	50
A 2	60
A 3	
B 1	
B 2	

**Key**

1 Force

Figure 3 — Strength of terminal**5.10 Temperature/vibration**

Apply to the fuse-links at the temperature of $(80 \pm 2)^\circ \text{C}$ a simple harmonic motion with a vibration acceleration of $4,5 g$, a vibration frequency of from 20 Hz to 200 Hz and a sweep time of 3 min. The electric current cycle, as shown in Figure 4, shall be applied 300 times.

^a One cycle.**Figure 4 — Current cycling at temperature/vibration test**

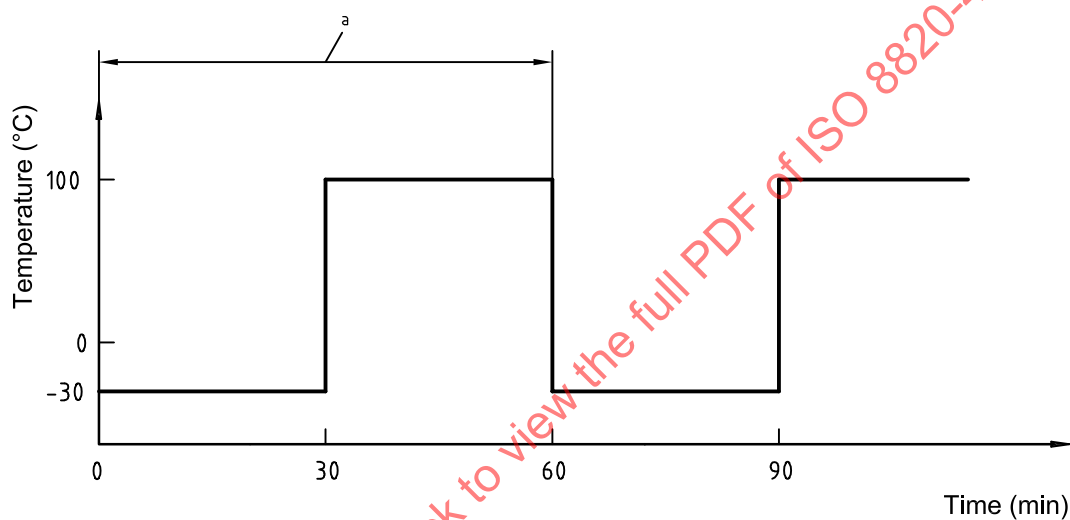
5.11 Temperature rise

The temperature rise shall be measured at the temperature-rise measuring point in the standard test fixtures as shown in annex A after supplying a current equal to 50 % of the rated current for 40 min.

5.12 Resistance against temperature shock

The fuse-links shall be subjected to 48 temperature shock cycles (see Figure 5). One cycle consists of

- a) 30 min at a temperature of $(-30 \pm 2) ^\circ\text{C}$,
- b) 15 s max. transition time,
- c) 30 min at the temperature of $(100 \pm 2) ^\circ\text{C}$, and
- d) 15 s max. transition time.



^a One cycle.

Figure 5 — Resistance against temperature shock

6 Performance requirements

6.1 General

See ISO 8820-1.

6.2 Voltage drop

6.2.1 General

See Tables 4 and 5.

Table 4 — Test sequence

No.	Required test	Test clause(s)/ Subclause	Performance clause(s)/ Subclause	Test sample group ^a								
				1	2	3	4	5	6	7	8	9
1	Dimensions and marking	4 and 7	4 and 7	X	X							
2	Fuse-links voltage drop	5.2	6.2	X								
3	Strength of terminals	5.9	6.9	X	X	X						
4	Accelerated ageing	5.5	6.5				X					
5	Fluid compatibility	5.5	6.5					X				
6	Vibration	5.4	6.4						X			
7	Transient current cycling	5.3	6.3							X		
8	Temperature/vibration	5.10	6.10								X	
9	Temperature rise	5.11	6.11									X
10	Resistance against temperature shock	5.12	6.12									X
11	Fuse-link voltage drop	5.2	6.2				X	X	X	X	X	X
12	Current step	5.7	6.7			X						
13	Breaking capacity	5.8	6.8	X								
14	Operating time-rating	$1,1 \times I_N$	5.6		X		X	X	X	X	X	X
		$2,0 \times I_N$			2		2	2	2	2	2	2
		$3,5 \times I_N$			2		2	2	2	2	2	2
		$6,0 \times I_N$			2		2	2	2	2	2	2
15	Strength of terminals	5.9	6.9	X	X	X	X	X	X	X	X	X

Each sample group shall contain six fuse-links (total 54).

^a The "2" for groups 2, 4, 5, 6, 7, 8 and 9 in the operating time-rating test (see No. 14), denotes that the entire group is subject to $1,1 \times I_N$ and then split into subgroups of two samples for each of the test currents $2,0 \times I_N$ to $6,0 \times I_N$.

Table 5 — Fuse-links voltage drop and colour coding

Fuse-link rating	Maximum voltage drop ^a	Colour
A	mV	
20	250	Light blue
30		Pink
40		Green
50		Red
60		Yellow
70		Brown
80		Black
100		Blue
120		White
^a These values are measured at (23 ± 5) °C.		

6.2.2 Requirement

After the test sequence (see Table 4) the electrical state of the fuse-links shall be visible.

6.3 Transient current cycling

See Table 4 and ISO 8820-1.

6.4 Vibration

See Table 4 and ISO 8820-1.

6.5 Environmental exposure

See Table 4 and ISO 8820-1.

6.6 Operating time-rating

See Tables 4 and 6

Table 6 — Operating time

Test current A	Operating time s	
	min.	max.
$1,1 I_N$	14 400	No requirement
$2,0 I_N$	5	100
$3,5 I_N$	0,2	7
$6,0 I_N$	0,04	1

6.7 Current steps

See Table 4 and ISO 8820-1.

6.8 Breaking capacity

See Table 4 and ISO 8820-1.

6.9 Strength of terminals

See Table 4 and ISO 8820-1.

6.10 Temperature/vibration

See Table 4.

6.11 Temperature rise

See Tables 4 and 7.

Table 7 — Temperature rise

Fuse-link rating A	Temperature rise °C
20	50
30	
40	
50	
60	
70	
80	70
100	
120	

6.12 Resistance to temperature shock

See Table 4.

7 Dimensions

7.1 Fuse-links with female contacts

The dimensions of fuse-links with female contacts A1, A2 and A3 shall be in accordance with Figure 6 (see Table 8).

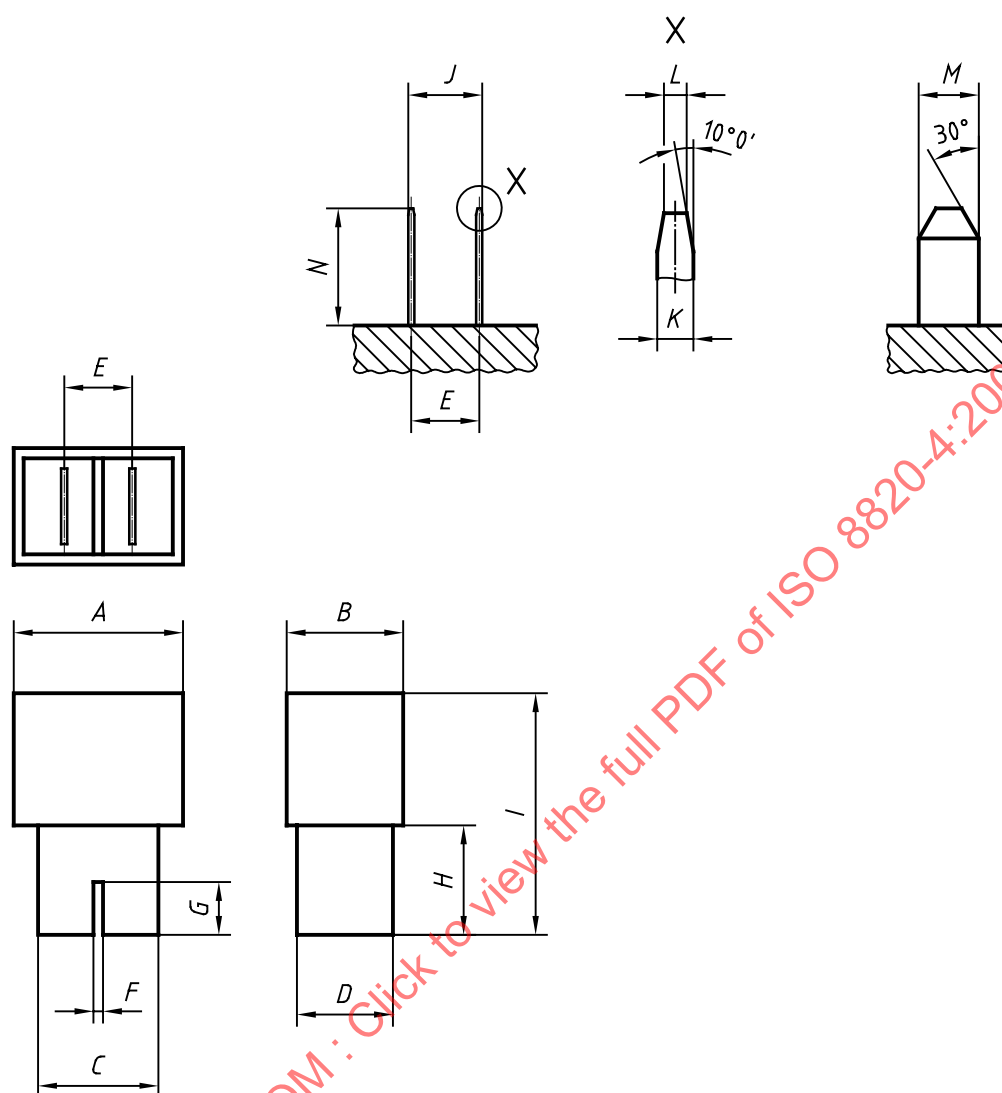


Figure 6 — Fuse-link with female contacts A1, A2 and A3

Table 8 — Fuse-links with female contacts A1, A2 and A3

Dimensions in millimetres

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	max.	max.	max.	max.	$\pm 0,1$	min.	min.	min.	max.	$\pm 0,1$		max.	$\pm 0,1$	$+0,2$ 0
A1	17,1	13,4	12,2	10,1	5,5	—	—	17,3	29,0	6,3	$0,8 \begin{smallmatrix} +0,04 \\ -0,03 \end{smallmatrix}$	0,5	6,3	10,2
A2	22,4	15,4	15,9	12,7	9,0	1,3	7,0	14,5	32,0	9,8	$0,8 \begin{smallmatrix} +0,06 \\ -0,01 \end{smallmatrix}$	0,5	8,0	15,5
A3	23,0	16,4	18,8	13,9	12,4	—	—	20,3	40,2	13,6	$1,2 \pm 0,03$	0,7	9,5	14,5

7.2 Fuse-links with bolt-in contacts B1

The dimensions of fuse-links with bolt-in contacts B1 shall be in accordance with Figure 7.

7.3 Fuse-links with bolt-in contacts B2

The dimensions of fuse-links with bolt-in contacts B2 shall be in accordance with Figure 8.

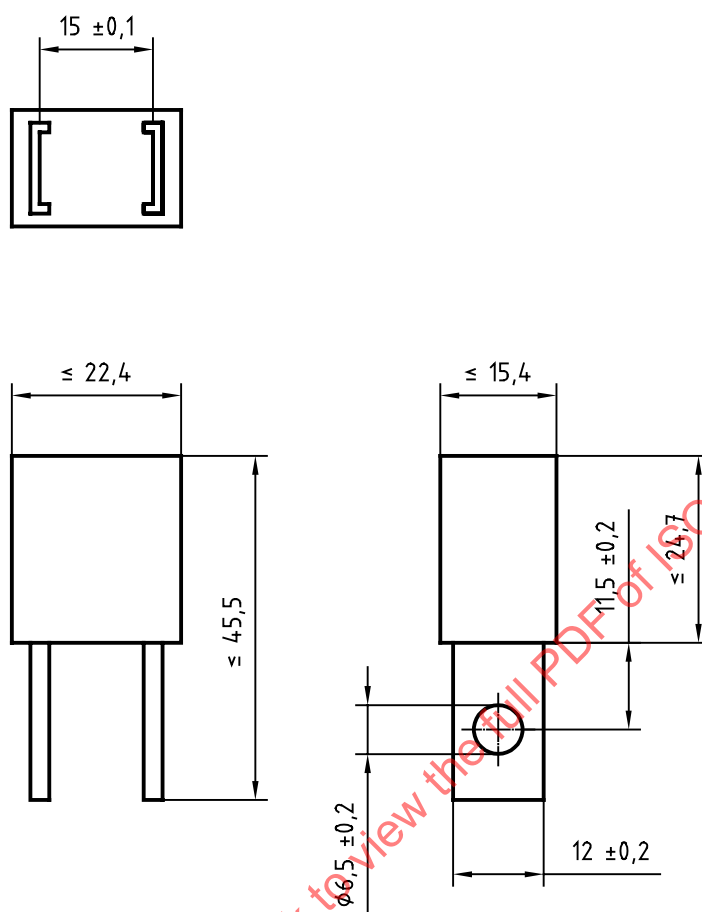


Figure 7 — Fuse-link with bolt-in contacts B1

8 Test sequence

See Table 4.

Dimensions in millimetres

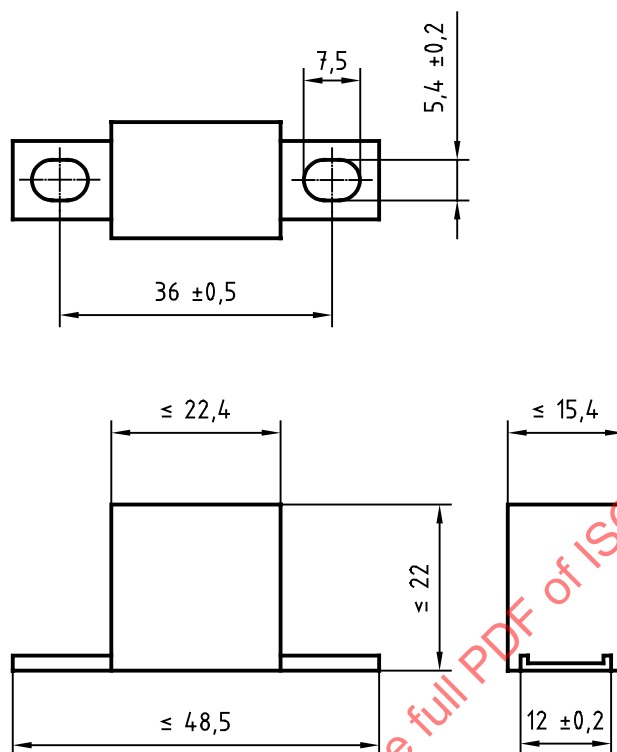


Figure 8 — Fuse-link with bolt-in contacts B2