INTERNATIONAL STANDARD

ISO 8820-4

Second edition
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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 —

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

Reference number
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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.org
Web www.iso.org

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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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

This second edition cancels and replaces the first edition (ISO 8820-4:2002), which has been technically revised.

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

— *Part 1: Definitions and general test requirements*

— *Part 2: User's guide*

— *Part 3: Fuse-link with tabs (blade type) Type C (medium), Type E (high current) and Type F (miniature)*

— *Part 4: Fuse-links with female contacts (type A) and bolt-in contacts (type B) and their test fixtures*

— *Part 5: Fuse-links with axial terminals (Strip fuse-links) Types SF30 and SF51 and test fixtures*

— *Part 6: Single-bolt fuse-links*

— *Part 7: Fuse-links with tabs (Type G) with rated voltage of 450 V*

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 fuse-links with female contacts (type A) and bolt-in contacts (type B) for use in road vehicles. It establishes, for these fuse-link types, the rated current, test procedures, performance requirements and dimensions.

This part of ISO 8820 is applicable to fuse-links with a rated voltage of 32 V or 58 V, a current rating $\leqslant$ 140 A and a breaking capacity of 1 000 A intended for road vehicles.

This part of ISO 8820 is intended to be used in conjunction with ISO 8820-1 and with ISO 8820-2. The numbering of its clauses corresponds to that of ISO 8820-1 whose requirements are applicable, except where modified by requirements particular to this part of ISO 8820.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 6722, *Road vehicles — 60 V and 600 V single-core cables — Dimensions, test methods and requirements*

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

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

3 Terms and definitions

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

4 Marking, labelling and colour coding

See ISO 8820-1 and Table 1.

Table 1 — Fuse-link colour coding

Fuse rating A	Colour
20	Light blue
25	White
30	Pink
35	Dark green
40	Green
50	Red
60	Yellow
70	Brown
80	Black
100	Blue
120	White
140	Red-brown

5 Tests and requirements

5.1 General

In addition to carrying out the test procedures in accordance with ISO 8820-1 the following criteria shall be observed:

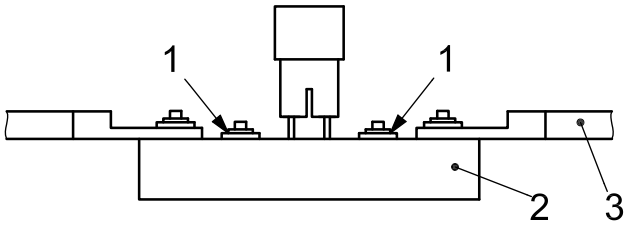
Tests shall be performed following the test sequences in Table 2.

The test fixtures for electrical tests (see Annex A) shall be designed in accordance with Figure 1. The connection resistance shall be for type A $\leqslant$ 1,0 mΩ and for type B $\leqslant$ 0,35 mΩ to ensure the proper functioning of the test fixture.

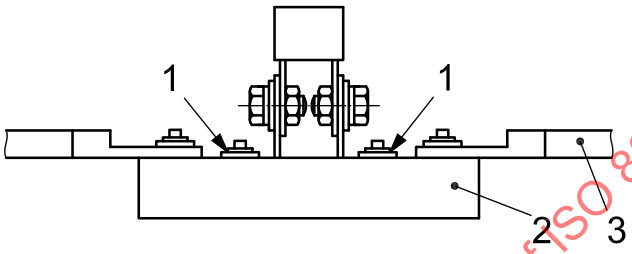
Fuse-links in accordance with this part of ISO 8820 shall provide for visible evidence of an open fuse element.

NOTE For measuring the contact resistance of Type A, the body of the fuse-link may require modification or resistance of the fuse element should be subtracted from the one of whole fuse (see Figure 1, points labelled “1”).

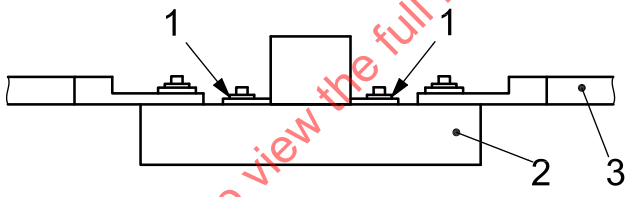
Dimensions in millimetres



a) Test fixture for type A1, A1S, A2 and A3



b) Test fixture for type B1



c) Test fixture for type B2

Key

1 measuring points for the voltage drop (see 5.2)
2 test fixture
3 cable size according to Table 3

Figure 1 — Test schematic

5.2 Test sequence

Table 2 — Test sequence

No.	Test		(Sub-) Clause	Sample groups[a]							
				1	2	3	4	5	6	7	8
1	Dimensions		6	X	X	X	—	—	—	—	—
2	Marking, labelling and colour coding		4	X	X	X	X	X	X	X	X
3	Fuse-link voltage drop		5.4	X	X	X	—	—	—	—	—
4	Strength of terminals		5.10	X	X	X	—	—	—	—	—
5	Environmental conditions	Climatic load	5.6	—	—	—	X	—	—	—	—
		Chemical load		—	—	—	—	X	—	—	—
		Mechanical load		—	—	—	—	—	X	—	—
6	Transient current cycling		5.5	—	—	—	—	—	—	X	—
7	Temperature rise		5.11	—	—	—	—	—	—	—	X
8	Resistance against temperature shock		5.12	—	—	—	—	—	—	—	X
9	Fuse-link voltage drop		5.4	—	—	X	X	X	X	X	X
10	Current steps		5.8	—	—	X	—	—	—	—	—
11	Breaking capacity		5.9	X	—	—	—	—	—	—	—
12	Operating time-rating test	1,1 I_R	5.7	—	X	—	X	X	X	X	—
		1,35 I_R or 1,5 I_R		—	Y	—	Y	Y	Y	Y	—
		2,0 I_R		—	Y	—	Y	Y	Y	Y	—
		3,5 I_R		—	Y	—	Y	Y	Y	Y	—
		6,0 I_R		—	Y	—	Y	Y	Y	Y	—
13	Strength of terminals		5.10	X	X	X	X	X	X	X	X

[a] Each sample group shall contain a minimum of eight fuse-links.

Y For these operating time tests the sample groups 2, 4, 5, 6, 7 and 8 shall be divided equally. These fuses are intended to be subjected to a single operating time test only.

— Not required

5.3 Test cable sizes

Test cable sizes shall be as shown in Tables 3, 4 and 5. All tests for a particular fuse-link rating shall be performed using the same cable size.

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.

Table 3 — Test cable sizes

Fuse-link rating A	Type A1, A1S and A2	Type A3	Type B	Conductor cross-sectional area[a] mm²				Length mm
				Type A		Type B		
				I	II	I	II	
20	X			1,5	2,0			500 ± 50
25	X			2,5				
30	X		X		3,0	4,0	3,0	
35	X			4,0				
40	X		X		5,0	6,0	5,0	
50	X	X	X	6,0				
60	X	X	X					
70			X			10,0		
80		X	X	10,0				
100			X			16,0	15,0	
120			X					
140			X			25,0	20,0	

[a] Conductor material in accordance with ISO 6722.

5.4 Voltage drop

5.4.1 Tests

The voltage drop U_{ab} shall be measured at points labelled “1” across the fuse-link tabs as shown in Figure 1.

5.4.2 Requirements

See Table 4.

Table 4 — Fuse-link voltage drop

Fuse-link rating A	Maximum voltage drop mV		
	A1, A1S	A2, A3	B1, B2
20	125	180	
25			
30	120	180	140
35			
40		180	130
50		160	120
60	115		
70			
80		160	
100			
120			
140			

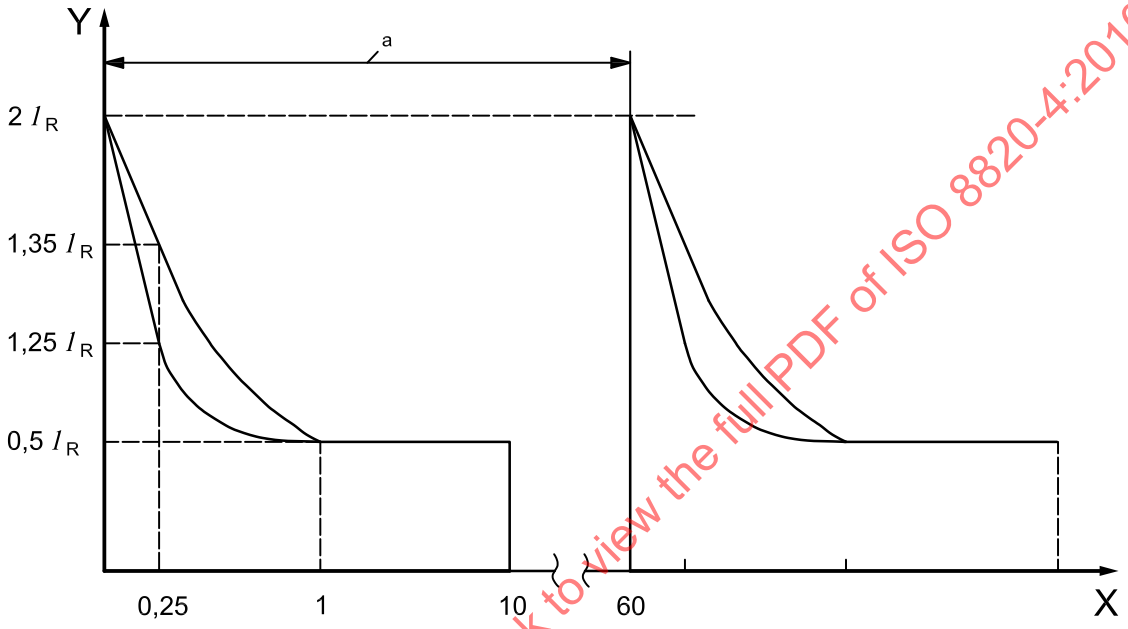
5.5 Transient current cycling

5.5.1 Test

See Figure 2 and ISO 8820-1. At an elapsed time of 0,25 s on-time, the current shall fall to a value between 1,25 I_R and 1,35 I_R. During the first 10 s of each cycle the steady state current shall never fall below 0,5 I_R.

5.5.2 Requirements

See ISO 8820-1.



Key

X time in seconds

Y rated current

[a] One cycle.

Figure 2 — Transient current cycling

5.6 Environmental condition

See ISO 8820-1.

5.7 Operating time-rating

5.7.1 Test

See ISO 8820-1.

5.7.2 Requirements

See Table 5.

Table 5 — Operating times

Test current A	Operating times s					
	A1, A1S		A2, A3		B1, B2	
	min.	max.	min.	max.	min.	max.
1,10 I_R	14 400	∞	14 400	∞	14 400	∞
1,35 I_R	60	1 800				
1,50 I_R			30	3 600	30	3 600
2,0 I_R	2	60	5	100	5	100
3,5 I_R	0,2	7	0,2	7	0,2	7
6,0 I_R	0,04	1	0,04	1	0,04	1

5.8 Current steps

5.8.1 Test

See ISO 8820-1.

5.8.2 Requirements

See ISO 8820-1.

5.9 Breaking capacity

5.9.1 Test

See ISO 8820-1.

Test at 1 000 A with cable sizes as shown in Table 3.

5.9.2 Requirements

See ISO 8820-1.

After the test, the current through the fuse-link shall not exceed 0,5 mA at the rated voltage.

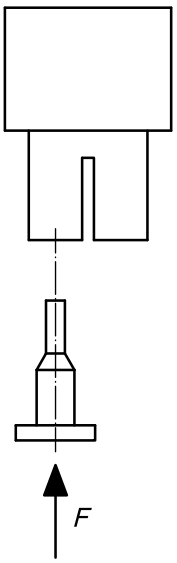
5.10 Strength of terminals

5.10.1 Test for fuse-links of types A1, A1S, A2 and A3

The following force (see Table 6) shall be applied sequentially to each terminal of the fuse-link as shown in Figure 3.

Table 6 — Forces

Fuse-link type	Force in N
A 1, A1S	50 ± 1
A 2	60 ± 1
A 3	



Key

F force

Figure 3 — Strength of terminals

5.10.2 Requirements

After the test, the insulator shall be intact and the terminals shall not be bent and/or removed from the insulator.

5.10.3 Test for fuse-links of types B1, B2

Install the fuse-links in the test fixture with the mounting torque according to Table 7. This test is performed without cables and terminals.

Table 7 — Mounting torque and bolt size

Fuse-link type	Mounting torque N·m	Bolt size
B1	6 ± 1	M 6
B2	4,5 ± 1	M 5

NOTE For mounting in the vehicle, the specific procedure (greasing, surface materials, surface roughness, etc.) has to be agreed upon between the fuse manufacturer, the fuse-box manufacturer and the vehicle manufacturer.

5.10.4 Requirement

Fuse-links shall remain physically intact.

5.11 Temperature rise

5.11.1 Test

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 0,50 I_R after the temperature is stabilized.

5.11.2 Requirements

See Table 8.

Table 8 — Temperature rise

Fuse-link rating A	Temperature rise °C
20	50
25	
30	
35	
40	
50	
60	
70	
80	70
100	
120	
140	

5.12 Rapid change of temperature with specified transition duration

See ISO 16750-4.

The test temperature shall be code J and the temperature holding time is 20 min.

Perform the test for 48 cycles.

6 Dimensions

6.1 Fuse-links types A1, A2 and A3

See Figure 4 and Table 9.

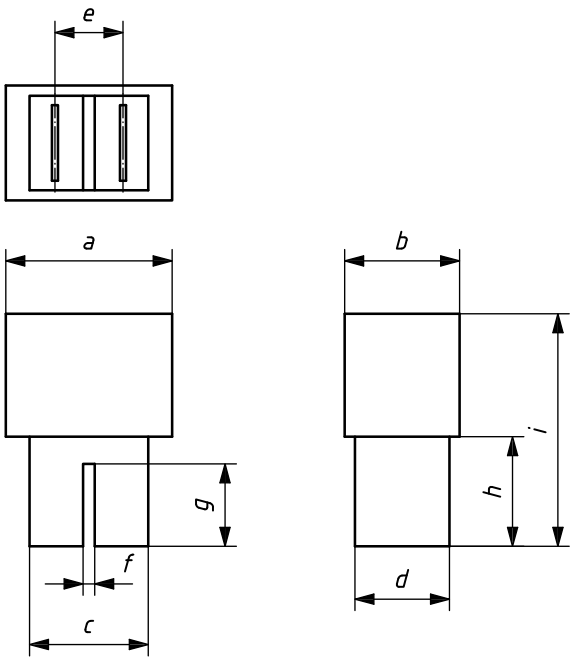
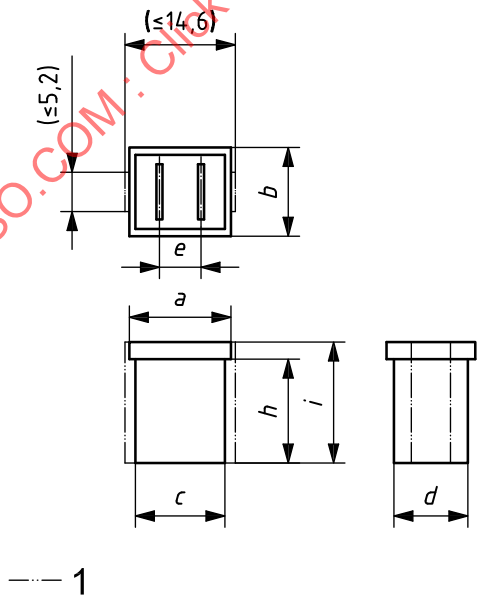


Figure 4 — Fuse-link with female contacts A1, A2 and A3

6.2 Fuse-links type A1S

See Figure 5 and Table 9.

Dimensions in millimetres



Key

1 represents optional feature

Figure 5 — Fuse-link with female contacts A1S

Table 9 — Fuse-links with female contacts A1, A1S, A2 and A3

Dimensions in millimetres

Dimension	A1		A1S		A2		A3	
	Value	Tolerance	Value	Tolerance	Value	Tolerance	Value	Tolerance
a	13,45	±1,15	13,45	±1,15	22,0	±0,5	22,25	±0,75
b	11,75	±0,75	11,75	±0,75	15,2	±0,5	15,25	±0,55
c	11,85	±0,35	11,85	±0,35	15,7	±0,5	18,55	±0,25
d	9,8	±0,3	9,8	±0,3	12,5	±0,5	13,6	±0,3
e	5,5	±0,1	5,5	±0,1	9,0	±0,2	12,4	±0,1
f	—	—	—	—	1,55	±0,35	—	—
g	—	—	—	—	10,9	±4,1	—	—
h	18,1	±0,8	13,75	±0,55	14,5	±0,5	21,3	±1
i	27,0	±0,5	16,0	±0,5	30,75	±1,25	31,0	±0,5

— Not applicable.

NOTE These values are for fuse-links only.

6.3 Fuse-links types B1 and B2

See Figures 6 and 7, and Table 10.

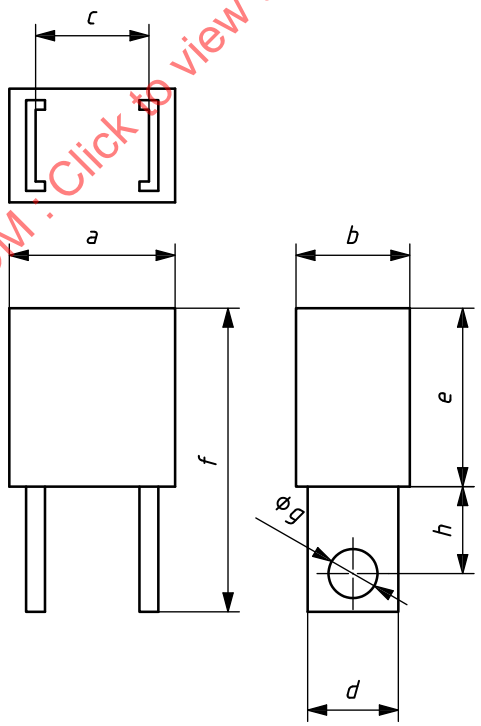


Figure 6 — Fuse-link with bolt-in contacts B1

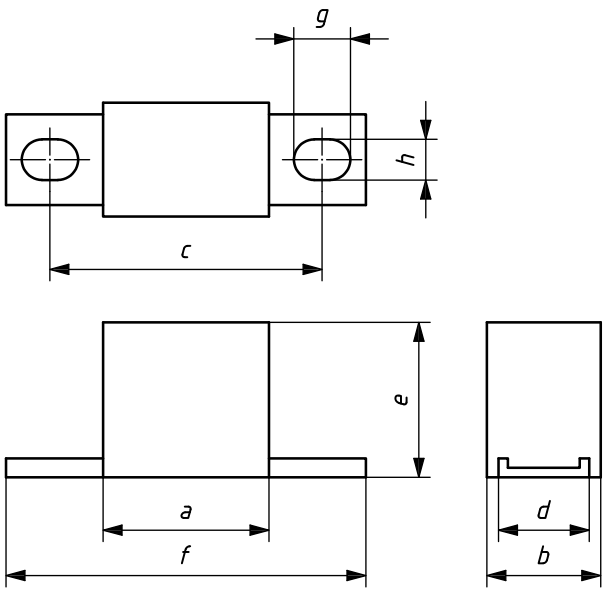


Figure 7 — Fuse-link with bolt-in contacts B2

Table 10 — Fuse-links with bolt-in contacts B1, B2

Dimensions in millimetres

Dimension	B1		B2	
	Value	Tolerance	Value	Tolerance
a	21,95	±0,45	21,95	±0,45
b	15,05	±0,35	15,05	±0,35
c	15,0	±0,1	36,0	±0,5
d	12,0	±0,2	12,0	±0,2
e	23,6	±1,1	20,50	±1,5
f	40,15	±3,55	47,6	±0,9
g	6,5	±0,2	7,5	±0,3
h	11,5	±0,2	5,4	±0,2
NOTE These values are for fuse-links only.				

6.4 Designation

A fuse-link Type A1 in accordance with this part of ISO 8820 for a nominal current of 25 A is designated as follows:

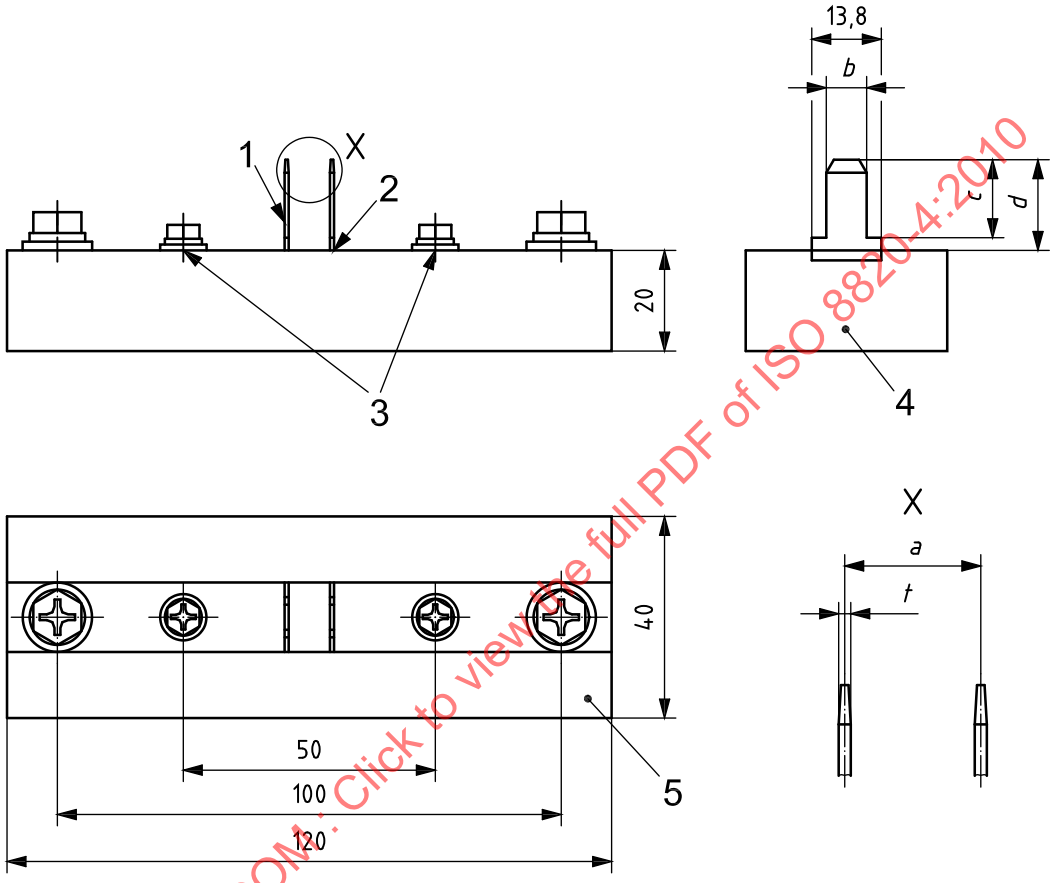
Fuse-link ISO 8820 – A1 – 25

7 Test fixtures

7.1 Test fixture for fuse-links types A1, A1S, A2 and A3

See Figure 8 and Table 11.

Dimensions in millimetres



Key

1 terminal for fuse-link connection (made of copper alloy)
2 temperature measuring point (thermocouple)
3 voltage drop measuring point (millivolts)
4 terminal size
5 fixture body

Figure 8 — Test fixture for fuse-links types A1, A2 and A3

Table 11 — Dimensions (in millimetres)

Type	*a* ±0,1	*b* ±0,1	*c* $^{+0,2}_{0}$	*d*	*t*
A1	5,5	6,3	10,2	17,2	0,8 $^{+0,04}_{-0,03}$
A1S			8,4		
A2	9,0	8,0	15,5	18,0	
A3	12,4	9,5	14,5	19,8	1,2 ± 0,03