INTERNATIONAL STANDARD

ISO 8820-3

Third edition
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Road vehicles — Fuse-links —

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

Véhicules routiers — Liaisons fusibles —

Partie 3: Liaisons fusibles à languette (type plat) type C (moyen), type E (courant fort) et type F (miniature)

Reference number
ISO 8820-3:2010(E)

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

This third edition cancels and replaces the second edition (ISO 8820-3:2002), 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-links 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 SF 30 and SF 51 and test fixtures*

— *Part 6 Single-bolt fuse-links*

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

The following parts are under preparation:

— *Part 8: Fuse-links with bolt-in contacts (Type H and J) with rated voltage of 450 V*

— *Part 9: Fuse-links with shortened tabs (Type D)*

Road vehicles — Fuse-links —

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

1 Scope

This part of ISO 8820 specifies fuse-links with tabs (blade-type) Type C (medium), Type E (high current) and Type F (miniature) 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 for fuse-links with a rated voltage of 32 V or 58 V, a current rating of $\leqslant$ 100 A and a breaking capacity of 1 000 A intended for use in road vehicles.

This part of ISO 8820 is intended to be used in conjunction with ISO 8820-1 and 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 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

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 8820-2, *Road vehicles — Fuse-links — Part 2: User's guide*

3 Terms and definitions

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

4 Marking, labelling and colour coding

See ISO 8820-1 and Table 1.

Table 1 — Fuse-link colour coding

Current rating A	Colour
1	black
2	grey
3	violet
4	pink
5	tan/light brown
7,5	brown
10	red
15	blue
20	yellow
25	white[a]
30	green
35	dark green
40	orange
50	red
60	blue
70	brown
80	white[a]
100	violet

[a] For transparent fuse bodies, “white” means no colour is added to the plastic material.

5 Tests and requirements

5.1 General

In addition to carrying out the test procedures in accordance with ISO 8820-1, the following criteria apply.

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

The test fixtures for electrical tests shall be designed in accordance with Figure 1. The connection resistance shall be $\leqslant$ 0,8 mΩ for Type C (medium) and Type F (miniature) fuse-links and $\leqslant$ 0,35 mΩ for Type E (high current) fuse-links to ensure the proper function of the test fixture.

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

5.2 Test sequence

Table 2 — Test sequence

No.	Test		(Sub-)clause	Sample groups						
				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	Fuse-link voltage drop		5.2	X	X	X	—	—	—	—
4	Strength of terminals		5.8	X	X	X	—	—	—	—
5	Environmental conditions	Climatic load	5.4	—	—	—	X	—	—	—
6		Chemical load		—	—	—	—	X	—	—
7		Mechanical load		—	—	—	—	—	X	—
8	Transient current cycling		5.3	—	—	—	—	—	—	X
9	Fuse-link voltage drop		5.2	—	—	—	X	X	X	X
10	Current steps		5.6	—	—	X	—	—	—	—
11	Breaking capacity		5.7	X	—	—	—	—	—	—
12	Operating time rating test	I_R or 1,10 I_R[a]	5.5	—	X	—	X	X	X	X
		1,10 I_R[a]		—	Y	—	Y	Y	Y	Y
		1,35 I_R[a]		—	Y	—	Y	Y	Y	Y
		1,60 I_R		—	Y	—	Y	Y	Y	Y
		2,00 I_R		—	Y	—	Y	Y	Y	Y
		3,50 I_R		—	Y	—	Y	Y	Y	Y
		6,00 I_R		—	Y	—	Y	Y	Y	Y
13	Strength of terminals		5.8	X	X	X	X	X	X	X

Each sample group shall contain a minimum of 10 fuse-links for each rated current rating.

For the operating time rating tests marked “Y”, the sample groups 2, 4, 5, 6 and 7 shall be divided equally. These fuse-links are intended to be subjected to a single operating time-rating test only.

NOTE A dash (—) indicates that the test is not required.

[a] Not required for 100 A fuse-link.

5.3 Test cable sizes

Test cable sizes shall be as given in Table 3. 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

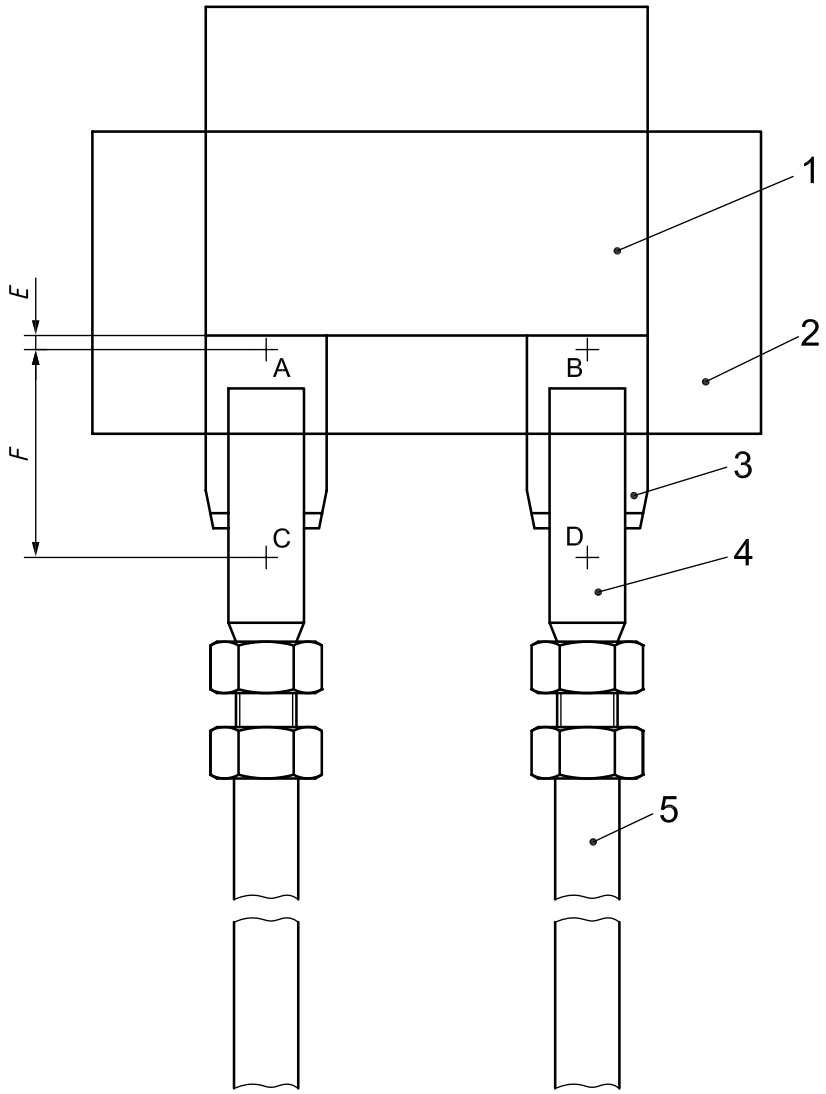
Rated current, I_R A	Conductor cross-sectional area[a] mm^2			Length mm
	Type F	Type C	Type E	
1	0,35	0,35		500 ± 50
2				
3				
4				
5	0,5	0,5		
7,5	0,75	0,75		
10	1,0	1,0		
15	1,5	1,5		
20	2,5	2,5	4,0	
25				
30	4,0	4,0		
35		6,0		
40				
50			6,0	
60				
70			10,0	
80				
100			16,0	

[a] Conductor material according ISO 6722.

5.4 Voltage drop

5.4.1 Tests

The voltage drop U_{AB} shall be measured at points A and B across the fuse-link tabs as shown in Figure 1.



Key

1 fuse-link
2 test fixture
3 fuse blade
4 test clip (cantilevered contact system, receptacle to accept tabs as defined in Table 7)
5 cable (size in accordance with Table 3)

E (1,5 ± 0,5) mm
F (15,5 ± 1) mm for miniature and medium fuse-links; (28,0 ± 1) mm for high current fuse-links

NOTE Points A and B are the measuring points for the voltage drop. Points A, C and B, D are the measuring points for connection resistance.

Figure 1 — Test schematic (Types C, E and F)

5.4.2 Requirements

See Table 4.

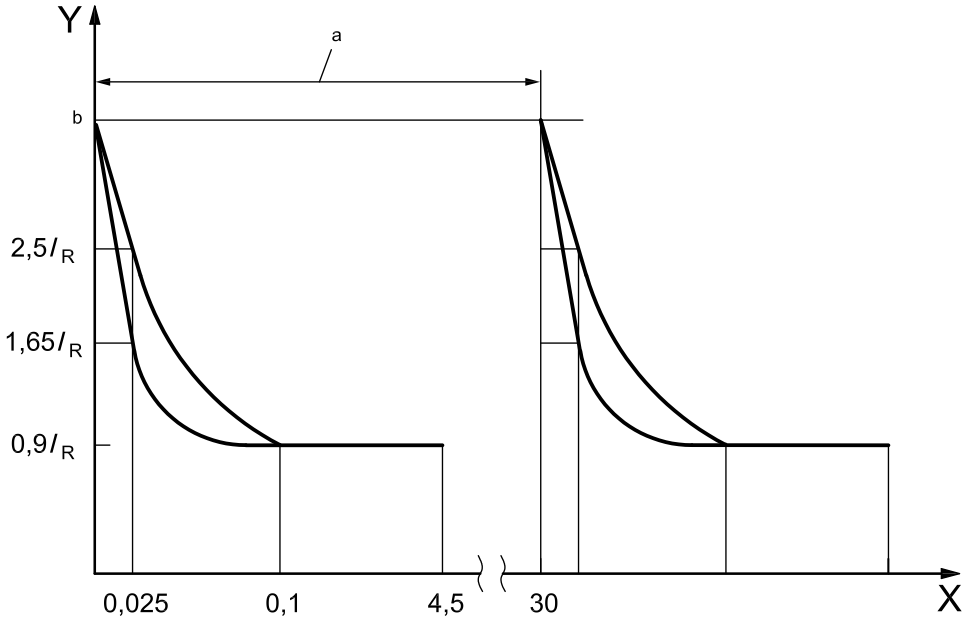
Table 4 — Voltage drop

Fuse rating A	**Maximum voltage drop**, U_{AB} mV
1	250
2	225
3	200
4	
5	175
7,5	150
10	140
15	125
20	
25	
30	120
35	
40	
50	
60	
70	110
80	
100	

5.5 Transient current cycling

5.5.1 Test

See Figure 2 and ISO 8820-1. At an elapsed time of 0,025 s on-time, the current shall fall to a value between 1,65 I_R and 2,5 I_R. At no time during the first 4,5 s of each cycle shall the steady state current fall below 0,9 I_R.



Key

X time (s)

Y current

a One cycle.

b (5,6 … 6) I_R for $I_R > 5$ A; (4,6 … 5) I_R for $I_R \leqslant 5$ A.

Figure 2 — Transient current cycling

5.5.2 Requirements

See ISO 8820-1.

5.6 Environmental conditions

See ISO 8820-1.

5.7 Operating time rating

5.7.1 Test

See ISO 8820-1. For I_R the test duration is 100 h.

5.7.2 Requirement

See Table 5.

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

Table 5 — Operating times

Test current A	Operating time s			
	Type C, F		Type E	
	min.	max.	min.	max.
I_R	—	—	360 000	∞
1,1 I_R	360 000	∞	—	—
1,35 I_R[a]	0,75	600	60	900
1,6 I_R	0,25	50	10	200
2,0 I_R	0,15	5	2	60
3,5 I_R	0,04	0,5	0,2	7
6 I_R	0,02	0,1	0,04	1

NOTE A dash (—) indicates that no value is specified.

[a] Not required for 100 A high-current fuse-links.

5.8 Current steps

5.8.1 Test

See ISO 8820-1.

5.8.2 Requirement

See ISO 8820-1. After activation, the current through the fuse-link shall not exceed 0,5 mA at the rated voltage of the fuse-link.

5.9 Breaking capacity

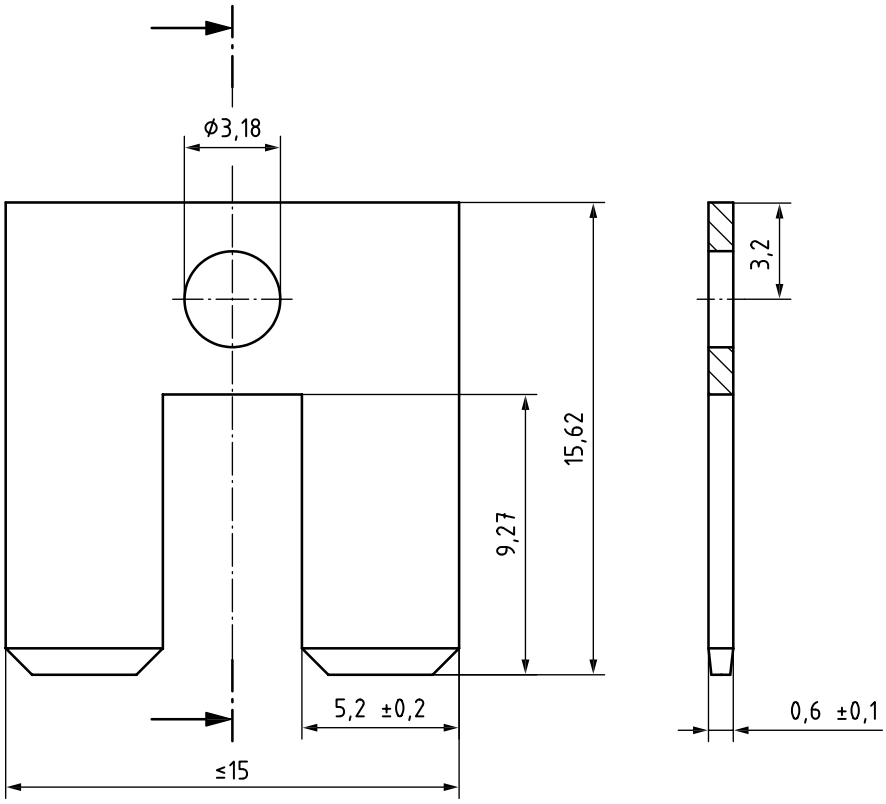
5.9.1 Test

See ISO 8820-1.

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

Use an appropriate test dummy in accordance with Figure 3, 4, 5 or 6.

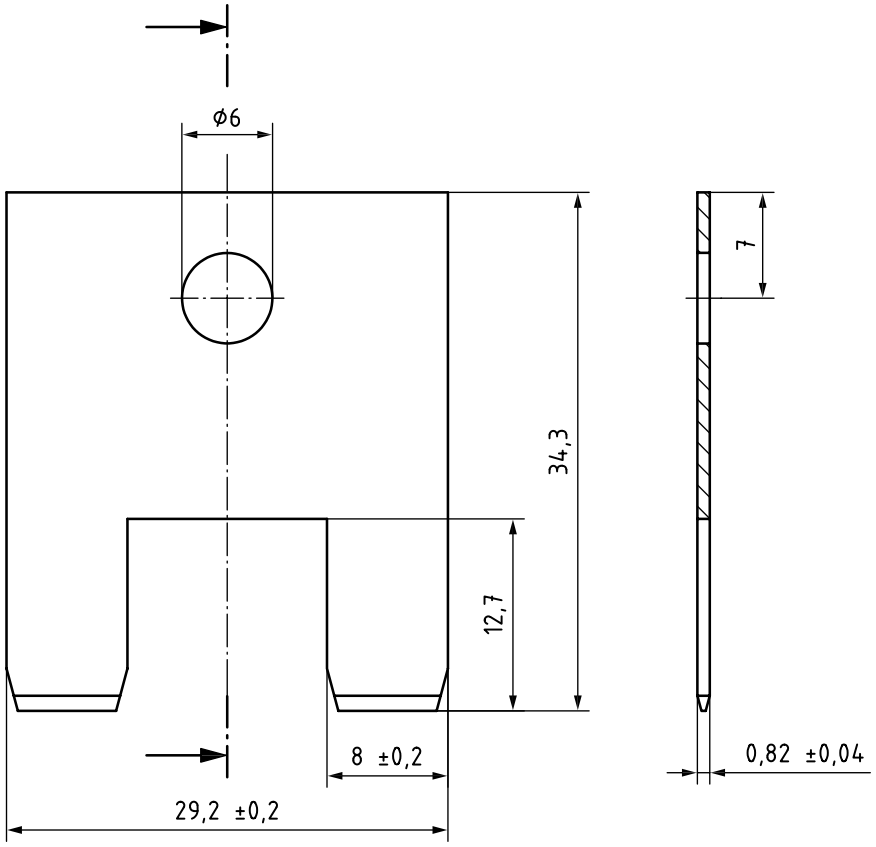
Dimensions in millimetres



Where not specified in the figure, the common tolerances shall be in accordance with tolerance class m as specified in ISO 2768-1.

Figure 3 — Test dummy for Type C fuse-links

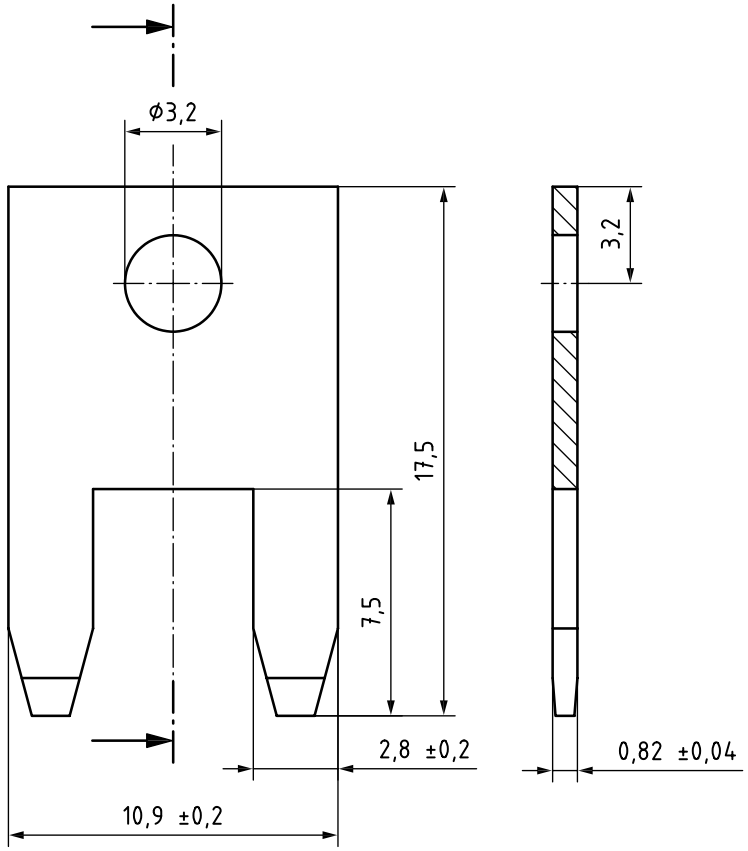
Dimensions in millimetres



Where not specified in the figure, the common tolerances shall be in accordance with tolerance class m as specified in ISO 2768-1.

Figure 4 — Test dummy for Type E fuse-links

Dimensions in millimetres



Where not specified in the figure, the common tolerances shall be in accordance with tolerance class m as specified in ISO 2768-1.

Figure 5 — Test dummy for Type F fuse-links

5.9.2 Requirement

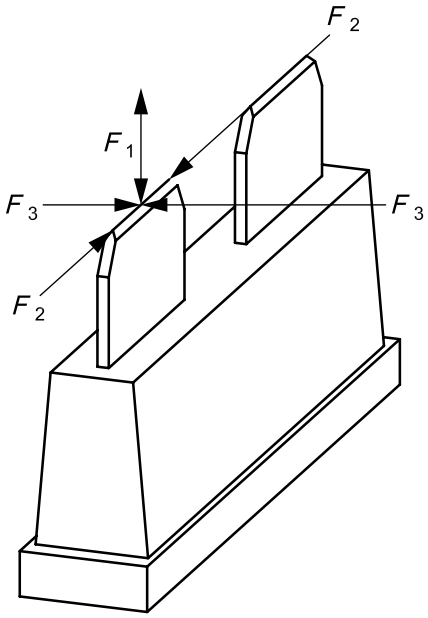
See ISO 8820-1.

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

5.10 Strength of terminals

Table 6 — Terminal forces

Fuse-link size	F_1 N	F_2 N	F_3 N
Type C	70 ± 1	15 ± 1	7,5 ± 1
Type E	90 ± 1	20 ± 1	10 ± 1
Type F	50 ± 1	10 ± 1	5 ± 1



NOTE The arrows indicate the directions of applied forces F_1 … F_3.

Figure 6 — Application of forces

5.10.1 Test

A force (F_1 … F_3) shall be applied to each of the tabs of the fuse-link in accordance with Figure 7. The force shall be held for 2 s. The test force shall not be applied abruptly.

5.10.2 Requirements

The deformation of the test sample shall not exceed 0,5 mm. After the test, the insulator shall be intact and the terminals shall not be removed from the insulator.

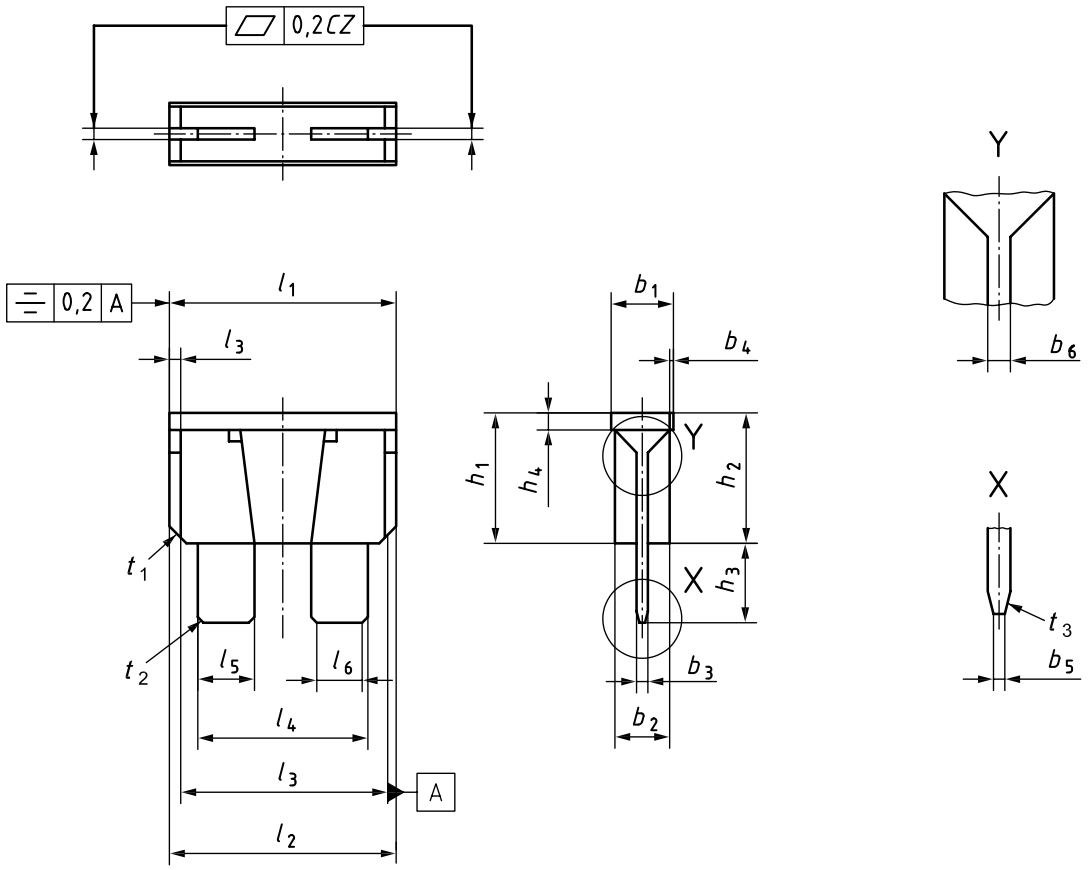
5.11 Temperature rise

See Annex A.

6 Dimensions

6.1 Fuse-links Types C, E and F

Dimensions in millimetres

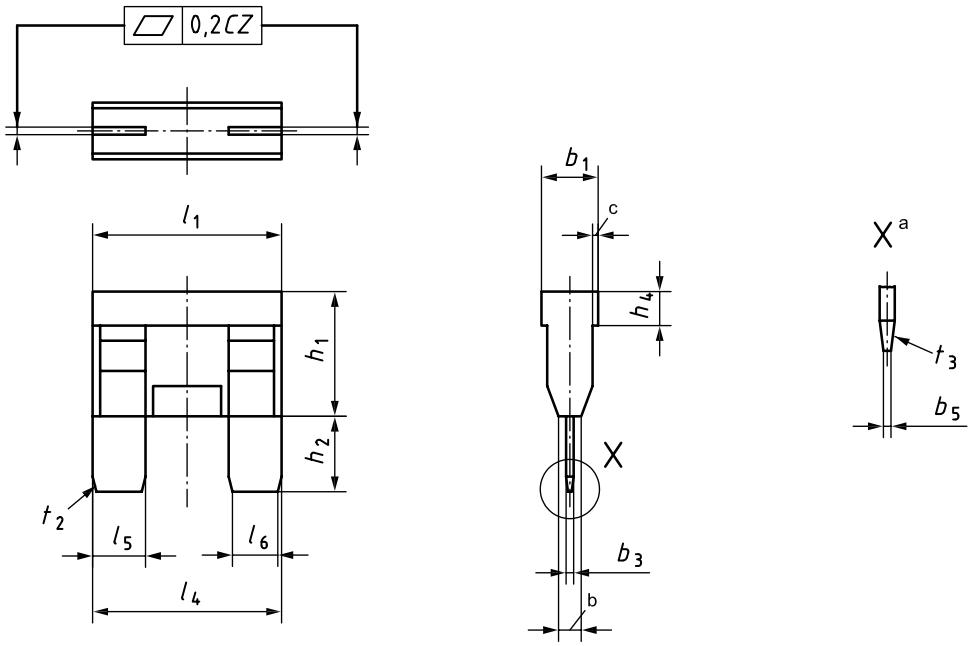


Key

t_1, t_2, t_3 taper

Figure 7 — Fuse-link Type C (medium)

Dimensions in millimetres



Key

t_2, t_3 taper

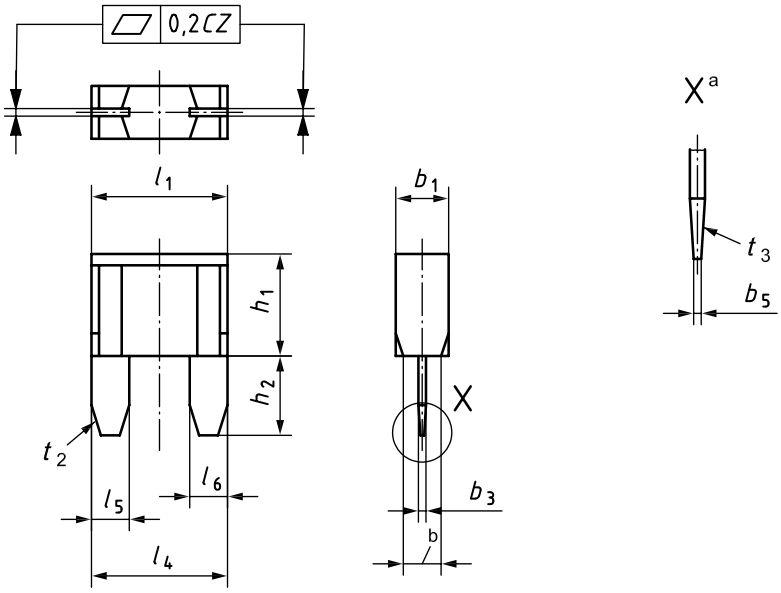
a Detail of X.

b Within the outline of the fuse-link housing, the tabs shall be insulated.

c Access area for the extraction tool according to manufacturer's choice.

Figure 8 — Fuse-link Type E (high current)

Dimensions in millimetres



Key

t_2, t_3 taper

a Detail of X.

b Within the outline of the fuse-link housing, the tabs shall be insulated.

Figure 9 — Fuse-link Type F

Table 7 — Dimensions of fuse-links with tabs, Type C, E and F

Dimension	Type C		Type E		Type F	
	Value	Tolerance	Value	Tolerance	Value	Tolerance
l_1	19,1	±0,3	29,5	±0,5	11,2	±0,8
l_2	18,9	±0,5	—	—	—	—
l_3	16,6	+0,3 −0,8	—	—	—	—
l_4	14,5	±0,3	29,0	+0,4 −0,5	10,8	±0,4
l_5	5,2	±0,2	8,0	±0,2	2,8	±0,2
l_6	4	±0,5	6,8	±0,5	1,3	±0,5
b_1	5,5	max.	9,0	±0,3	3,8	±0,4
b_2	3,0	min.	—[a]	n.s.	—[a]	n.s.
b_3	0,65	±0,05	0,82	+0,05 −0,04	0,82	+0,05 −0,04
b_4	0,6	±0,3	—[b]	—	—[b]	—
b_5	0,51	max.	0,6	0 −0,3	0,6	max.
b_6	1,0	±0,2	—	—	—	—
h_1	15	min.	22,0	max.	9	max.
h_2	6,5	±0,5	12,6	±0,5	7,5	±0,5
h_3	6,5	min.	—	—	—	—
h_4	2,5	+0,7 −1	—[b]	n.s.	n.s.	n.s.

NOTE 1 n.s. indicates that the value or tolerance is not specified.

NOTE 2 A dash (—) indicates that the value or tolerance is not applicable.

[a] Within the outline of the fuse-link housing, the tabs shall be insulated.

[b] Access area for the extraction tool according to manufacturer's choice.

6.2 Designation example

Designation of a fuse-link Type C in accordance with this part of ISO 8820 for a nominal current of 25 A:

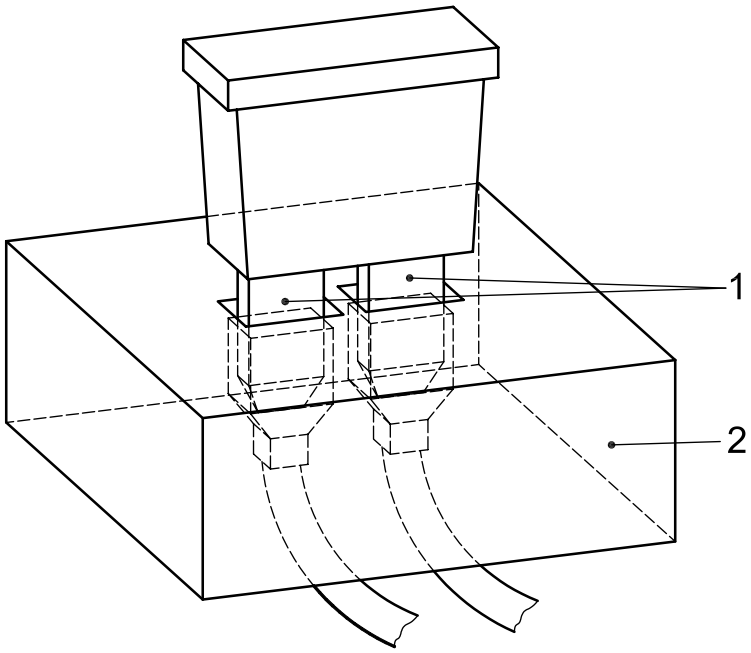
Fuse-link ISO 8820 – C – 25

Annex A
(informative)

Temperature rise test

A.1 Test

The test shall be carried out using fuse-links, fuse holders and connections as specified by the vehicle manufacturer. Test cable sizes shall be in accordance with Table 3. The test shall be performed in an oven with a test current of 0,7 I_R at an ambient temperature of 60 °C. The temperature shall be measured at the point the fuse-link terminals protrude from the base of the insulator using thermocouples as specified by the vehicle manufacturer (see Figure A.1).



Key

1 test points
2 test fixture

Figure A.1 — Temperature rise test setup

A.2 Requirement

After thermal equilibrium has been achieved, the temperature of the connections shall not exceed 80 °C.

ICS 43.040.10

Price based on 16 pages