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**Road vehicles — Fuse-links —**

Part 11:

**Fuse-links with tabs (blade type) Type  
M (medium-high current)**

*Véhicules routiers — Liaisons fusibles —*

*Partie 11: Liaison fusible à languette (type lame) Type M (courant  
médium-fort)*



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## Foreword

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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](http://www.iso.org/directives)).

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

A list of all parts in the ISO 8820 series can be found on the ISO website.

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# Road vehicles — Fuse-links —

## Part 11: Fuse-links with tabs (blade type) Type M (medium-high current)

### 1 Scope

This document specifies fuse-links with tabs (blade-type) Type M (medium-high current) for use in road vehicles. It establishes, for this fuse-link type, the rated current, test procedures, performance requirements and dimensions.

This document is applicable for fuse-links with a rated voltage of 32 V and a current rating of  $\leq 80$  A and a breaking capacity of 1 000 A intended for use in road vehicles.

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

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 6722-1, *Road vehicles — 60 V and 600 V single-core cables — Part 1: Dimensions, test methods and requirements for copper conductor cables*

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

### 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 4 Marking, labelling and colour coding

See ISO 8820-1 and [Table 1](#).

**Table 1 — Fuse-link colour coding**

Rated current, $I_R$ (A)	Colour Type M
20	yellow
25	white
30	green
35	dark green
40	orange
50	red
60	blue
70	brown
80	black/dark grey

## 5 Tests and requirements

### 5.1 General

#### 5.1.1 Test criteria

In addition to carrying out the test procedures in accordance with ISO 8820-1 the following criteria shall 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  $\leq 0,35 \text{ m}\Omega$  for Type M (medium-high current) to ensure the proper function of the test fixture.

Fuse-links according to this document shall provide for visible evidence of an open fuse-element.

#### 5.1.2 Test sequence

**Table 2 — Test sequence**

No	Test	Clause	Sample groups <sup>b</sup>						
			1	2	3	4	5	6	7
1	Dimensions	<a href="#">6</a>	X	X	X	—	—	—	—
2	Marking, labelling and colour coding	<a href="#">4</a>	X	X	X	X	X	X	X
3	Fuse-link voltage drop	<a href="#">5.2</a>	X	X	X	—	—	—	—
4	Strength of terminals	<a href="#">5.8</a>	X	X	X	—	—	—	—
5	Environmental conditions	Climatic load	—	—	—	X	—	—	—
6		Chemical load	—	—	—	—	X	—	—
7		Mechanical load	—	—	—	—	—	X	—
8	Transient current cycling	<a href="#">5.3</a>	—	—	—	—	—	—	X

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

<sup>a</sup> Not required for 80 A fuse-link Type M.

<sup>b</sup> Each sample group shall contain a minimum of 10 fuse-links for each rated current.

<sup>c</sup> 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 test only.

Table 2 (continued)

No	Test	Clause	Sample groups <sup>b</sup>						
			1	2	3	4	5	6	7
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 <sup>c</sup>	$I_R^a$	—	X	—	X	X	X	X
		$1,35 I_R$	—	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

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

<sup>a</sup> Not required for 80 A fuse-link Type M.

<sup>b</sup> Each sample group shall contain a minimum of 10 fuse-links for each rated current.

<sup>c</sup> 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 test only.

### 5.1.3 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 herein does not necessarily indicate the size of the cable to be used in the vehicle application.

Table 3 — Test cable sizes

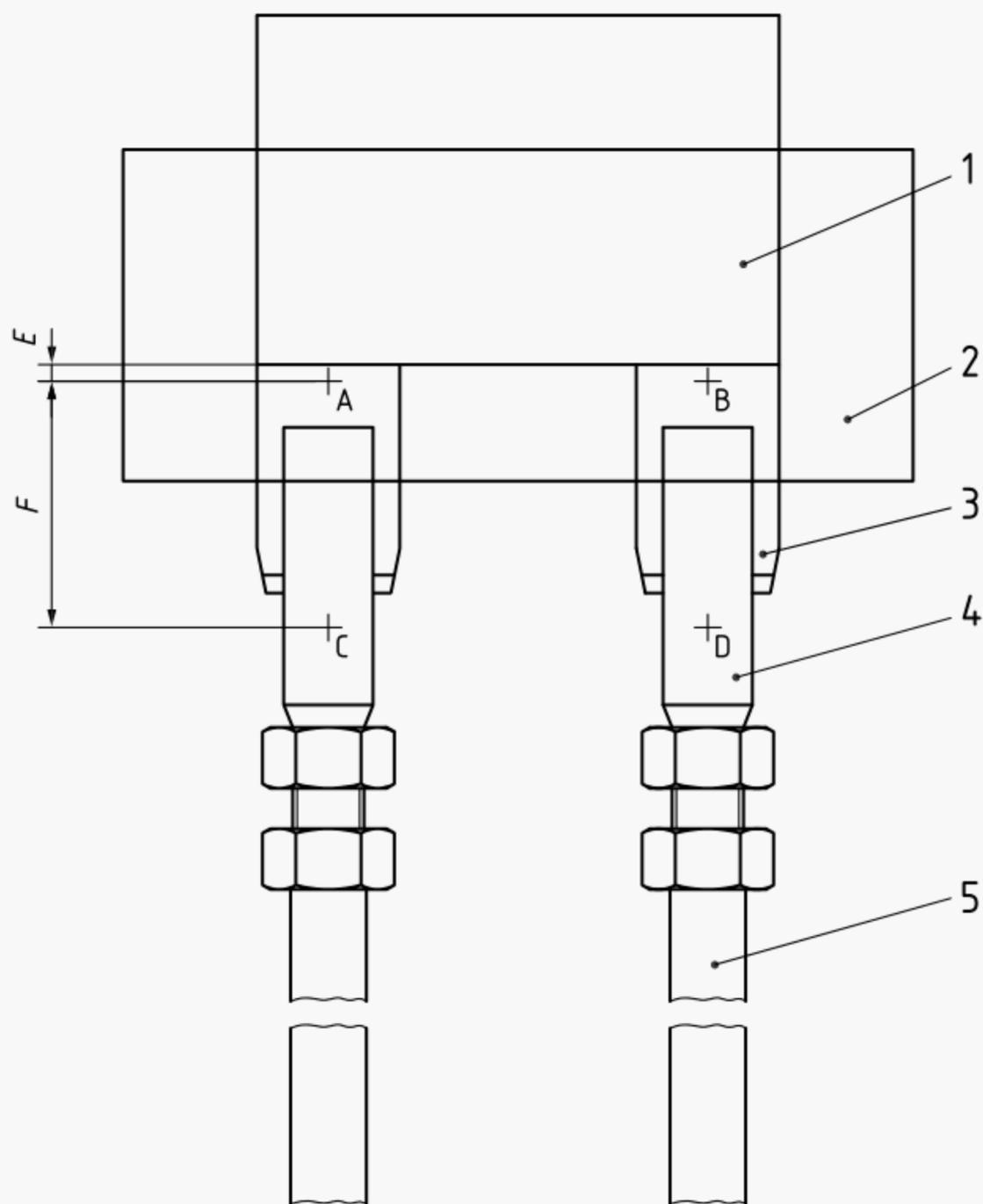
Rated current, $I_R$ (A)	Conductor cross-sectional area <sup>a</sup> (mm <sup>2</sup> )	Length (mm)
20	2,5	500 ± 50
25	2,5	
30	4,0	
35		
40		
50	6,0	
60		
70	10,0	
80		

<sup>a</sup> The conductor material shall be according to ISO 6722-1.

## 5.2 Voltage drop

### 5.2.1 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   | 5        | cable size according to <a href="#">Table 3</a> |
| 2 | test fixture  | <i>E</i> | $(1,5 \pm 0,5)$ mm                              |
| 3 | fuse blade  | <i>F</i> | $(28 \pm 1)$ mm                                 |
| 4 | test clip (cantilevered contact system, receptacle to accept tabs as defined in <a href="#">Table 7</a> ) |          |   |

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

**Figure 1 — Test schematic**

**5.2.2 Requirement**

See [Table 4](#).

Table 4 — Voltage drop

Rated current, $I_R$ (A)	Max. voltage drop, $U_{AB}$ (mV)
20	125
25	125
30	120
35	
40	
50	
60	
70	110
80	

Dimensions in millimetres

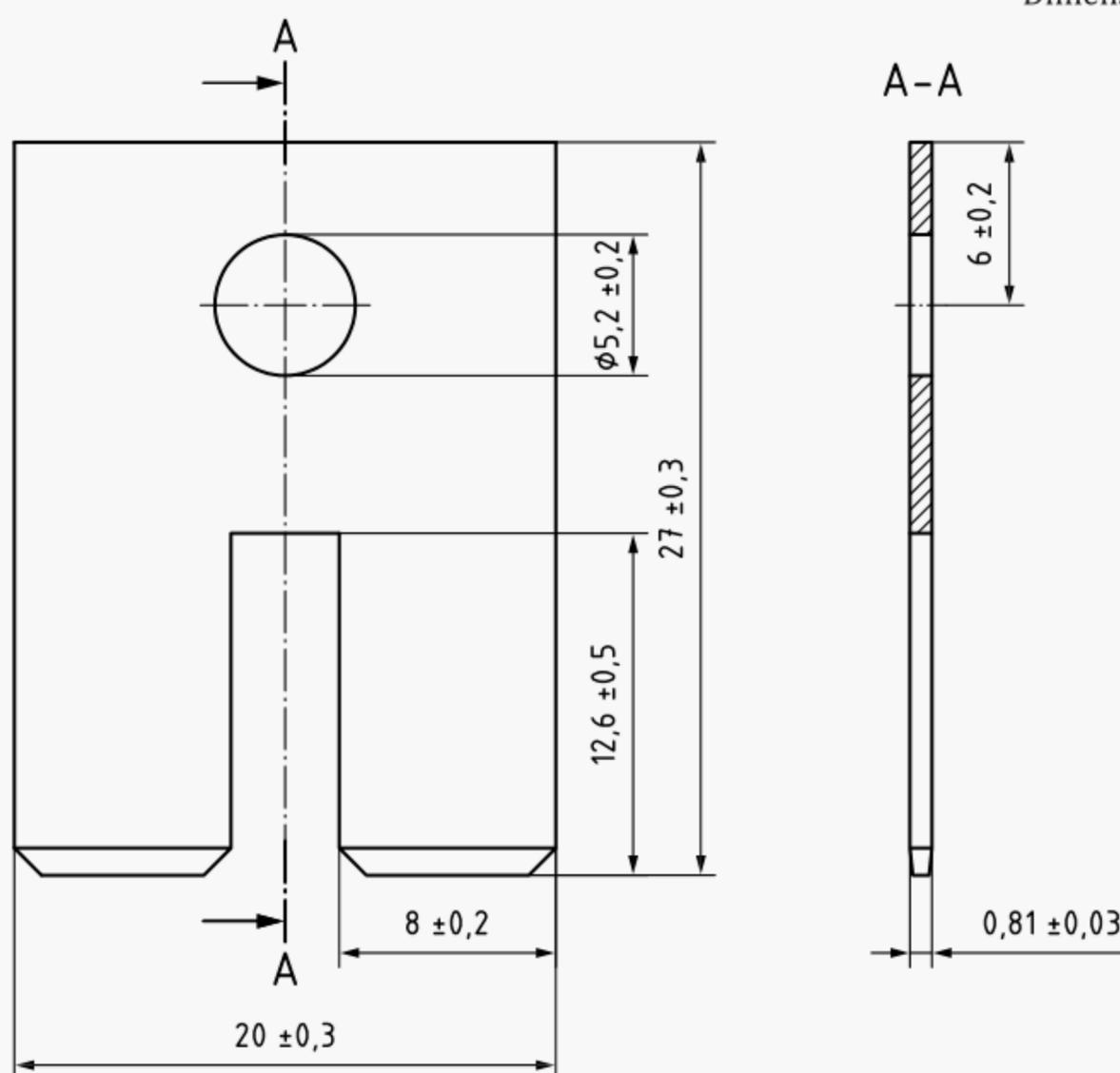


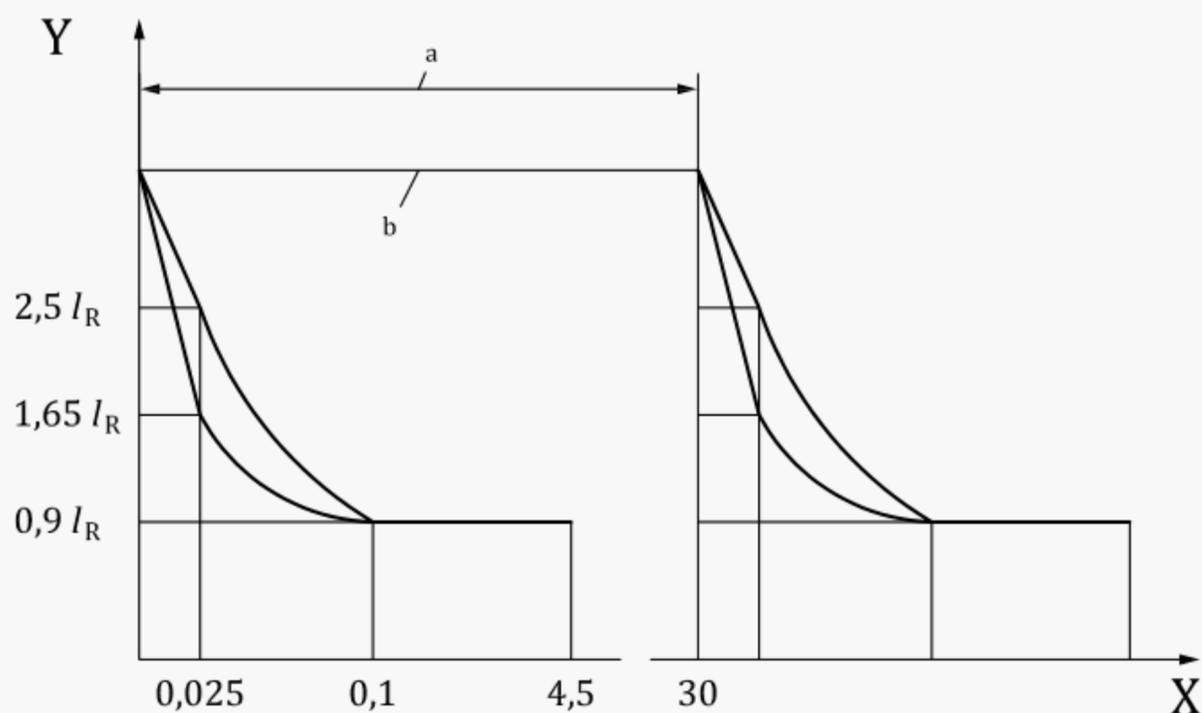
Figure 2 — Test dummy

Where not specified in the [Figure 2](#), the common tolerances shall be in accordance with tolerance class m as specified in ISO 2768-1.

### 5.3 Transient current cycling

#### 5.3.1 Test

See [Figure 3](#) 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 the steady state current shall fall below  $0,9 I_R$ .



**Key**

X time (s)

Y current

a One cycle.

b (5,6 ... 6) I<sub>R</sub>.

**Figure 3 — Transient current cycling**

**5.3.2 Requirement**

See ISO 8820-1.

**5.4 Environmental conditions**

See ISO 8820-1.

**5.5 Operating time rating**

**5.5.1 Test**

See ISO 8820-1. For I<sub>R</sub> the test duration is 100 h.

**5.5.2 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)	
	Minimum	Maximum
$I_R^a$	360 000	$\infty$
$1,1 I_R$	—	—
$1,35 I_R$	60	900
$1,6 I_R$	10	200
$2,0 I_R$	2	60
$3,5 I_R$	0,2	7,0
$6 I_R$	0,04	1,0

NOTE A dash (—) indicates that no value is specified.  
<sup>a</sup> Not required for 80A fuse-link Type M.

## 5.6 Current steps

### 5.6.1 Test

See ISO 8820-1.

### 5.6.2 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.

## 5.7 Breaking capacity

### 5.7.1 Test

See ISO 8820-1.

Test at 1 000 A with cable sizes as shown in [Table 3](#).

### 5.7.2 Requirement

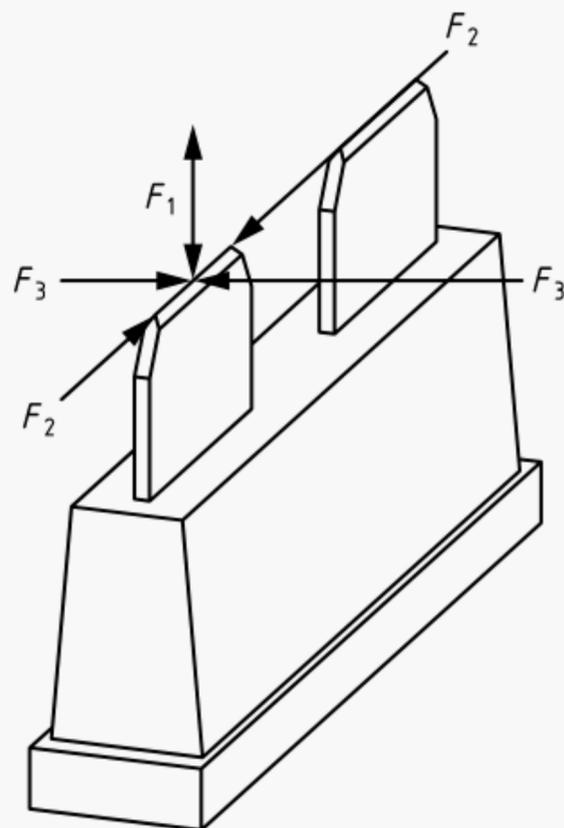
See ISO 8820-1.

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

## 5.8 Strength of terminals

**Table 6 — Terminal forces**

Fuse-Link size	$F_1$ N	$F_2$ N	$F_3$ N
Type M	$70 \pm 1$	$15 \pm 1$	$7,5 \pm 1$



NOTE The arrows indicate the directions of the applied forces  $F_1 \dots F_3$ .

**Figure 4 — Application of forces**

### 5.8.1 Test

Each tab of the fuse-link shall be tested with only one force (among  $F_1 \dots F_3$ ) and along only one direction in accordance with [Figure 4](#). The force shall be held for 2 s. The test force shall not be applied abruptly. See [Table 6](#) for terminal forces.

### 5.8.2 Requirement

The permanent 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.

## 5.9 Temperature rise

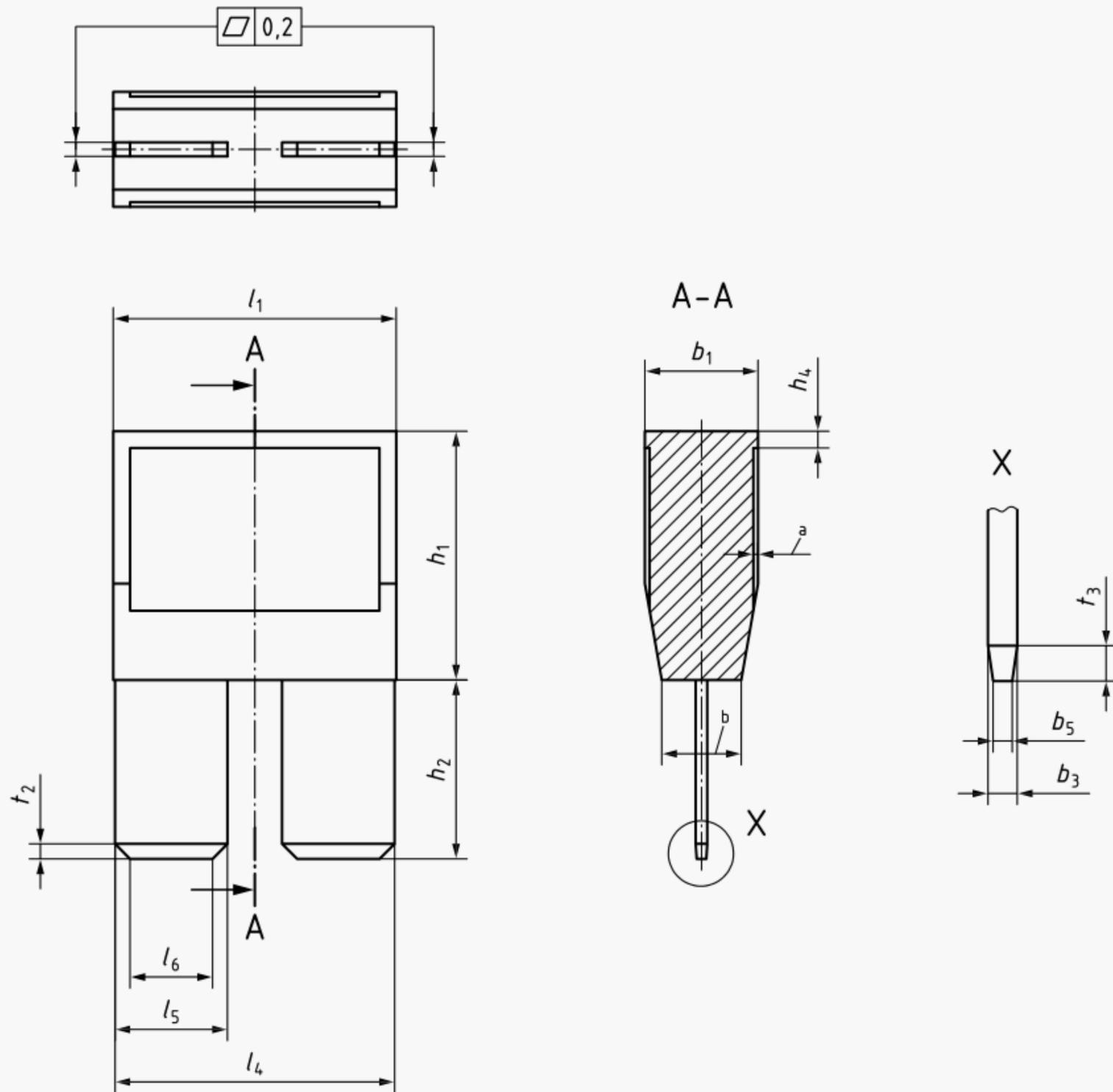
See [Annex A](#).

## 6 Dimensions

### 6.1 Fuse-links Type M

See [Figure 5](#) for the fuse-links Type M.

Dimensions in millimetres



**Key**

$t_2, t_3$  taper

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

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

**Figure 5 — Fuse-links Type M**

**Table 7 — Dimensions of fuse-links with tabs, Type M**

<b>Dimension</b>	<b>Value (mm)</b>	<b>Tolerance (mm)</b>
$l_1$	20,3	$\pm 0,3$
$l_4$	20,0	$\pm 0,3$
$l_5$	8,0	$\pm 0,2$
$l_6$	6,0	$\pm 0,5$
$b_1$	8,0	$\pm 0,3$
$b_3$	0,82	+0,05 -0,04
$b_5$	0,6	Max
$h_1$	17,5	$\pm 0,3$
$h_2$	12,6	$\pm 0,5$
$h_4$	1	$\pm 0,5$

## 6.2 Designation example

The designation of a fuse-link Type M in accordance with this document for a nominal current of 40 A is as follows:

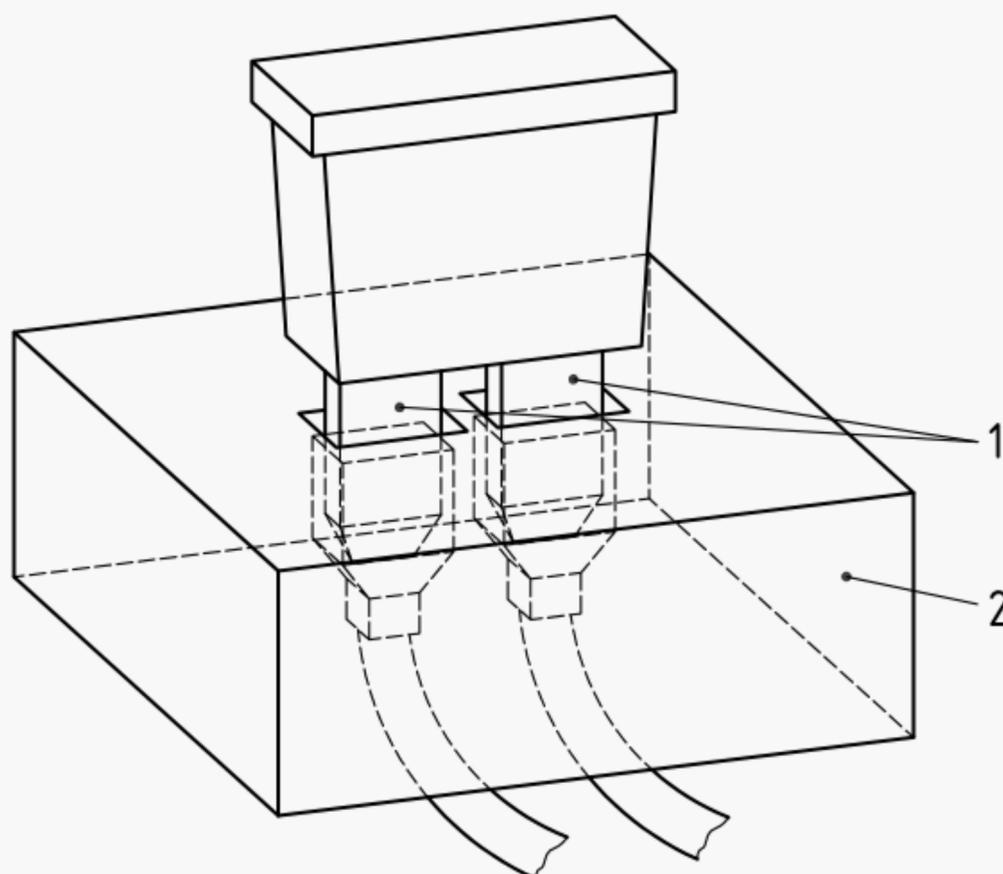
Fuse-link ISO 8820 – M – 40

## 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  $0,5 I_R$  at an ambient temperature of  $85\text{ }^{\circ}\text{C}$ . 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  $125\text{ }^{\circ}\text{C}$ .

## Bibliography

- [1] ISO 8820-2, *Road vehicles — Fuse-links — Part 2: User guidelines*



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