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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

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](http://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](http://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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# 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, $I_R$<br>(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   | <a href="#">5.4</a> | —                          | — | — | 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, $I_R$<br>(A) | Conductor cross-sectional area <sup>a</sup><br>(mm <sup>2</sup> ) | Length<br>(mm) |
|-----------------------------|-------------------------------------------------------------------|----------------|
| 20                          | 2,5                                                               | 500 ± 50       |
| 25                          | 2,5                                                               |                |
| 30                          | 4,0                                                               |                |
| 35                          |                                                                   |                |
| 40                          |                                                                   |                |
| 50                          |                                                                   |                |
| 60                          | 6,0                                                               |                |
| 70                          |                                                                   |                |
| 80                          | 10,0                                                              |                |
|                             |                                                                   |                |

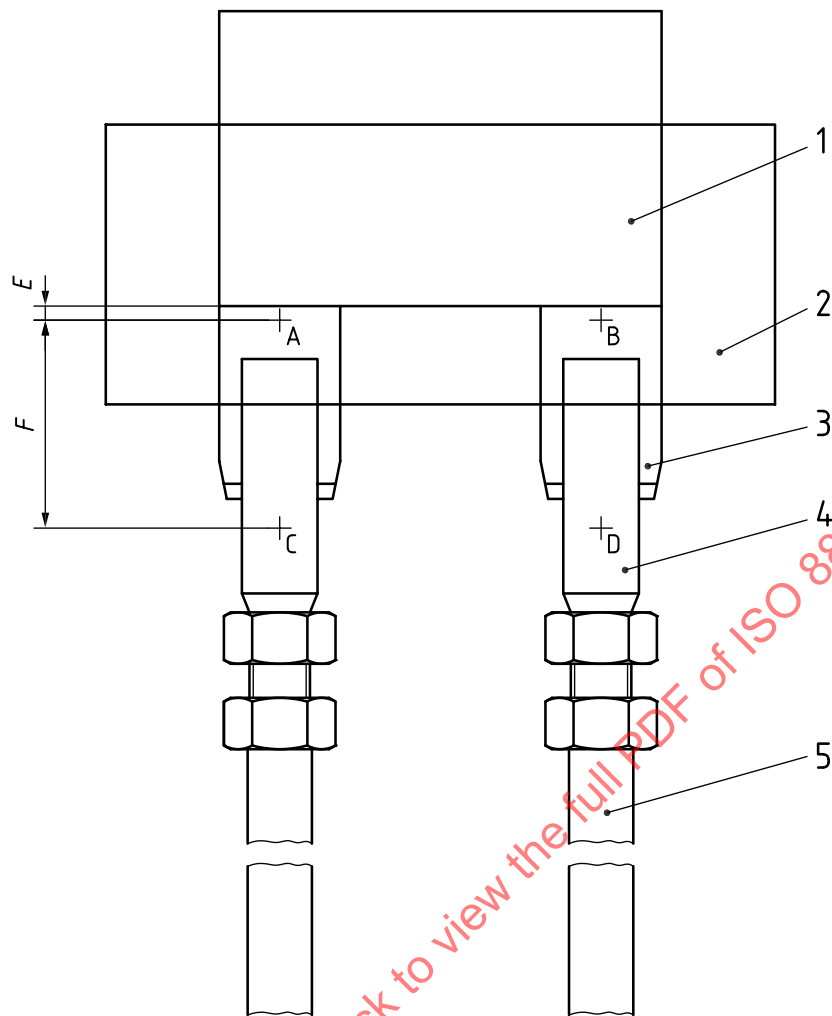
<sup>a</sup> The conductor material shall be according to ISO 6722-1.

<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, $I_R$<br>(A) | Max. voltage drop, $U_{AB}$<br>(mV) |
|-----------------------------|-------------------------------------|
| 20                          | 125                                 |
| 25                          | 125                                 |
| 30                          | 120                                 |
| 35                          |                                     |
| 40                          |                                     |
| 50                          |                                     |
| 60                          |                                     |
| 70                          | 110                                 |
| 80                          |                                     |

Dimensions in millimetres

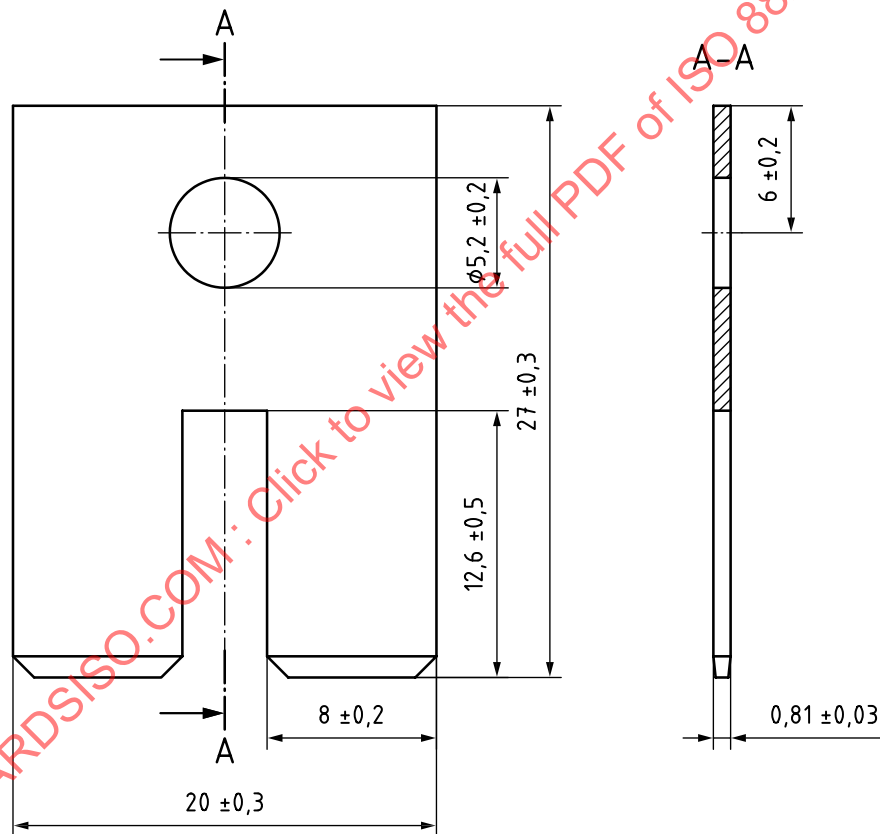


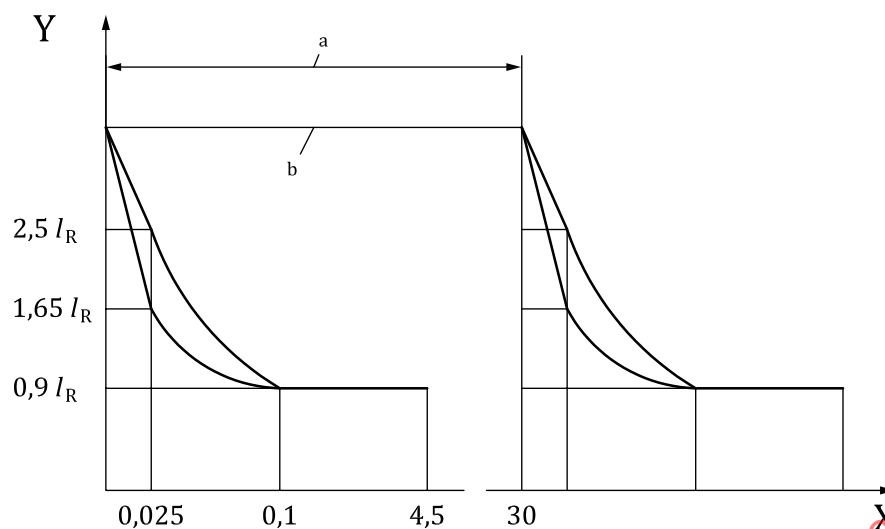
Figure 2 — Test dummy

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  $(5,6 \dots 6) I_R$

**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  $I_R$  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<br>(A)                                   | Operating time<br>(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

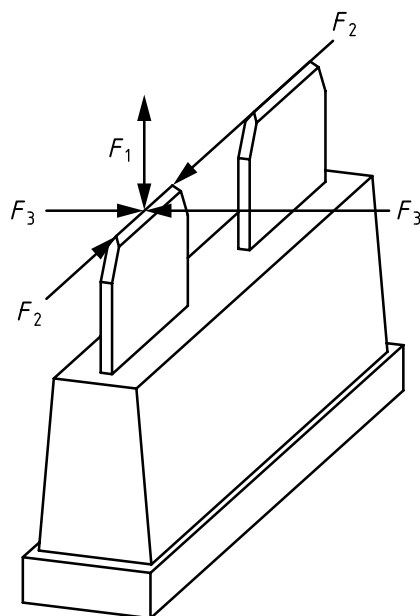
See ISO 8820-1.

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 | $F_1$<br>N | $F_2$<br>N | $F_3$<br>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

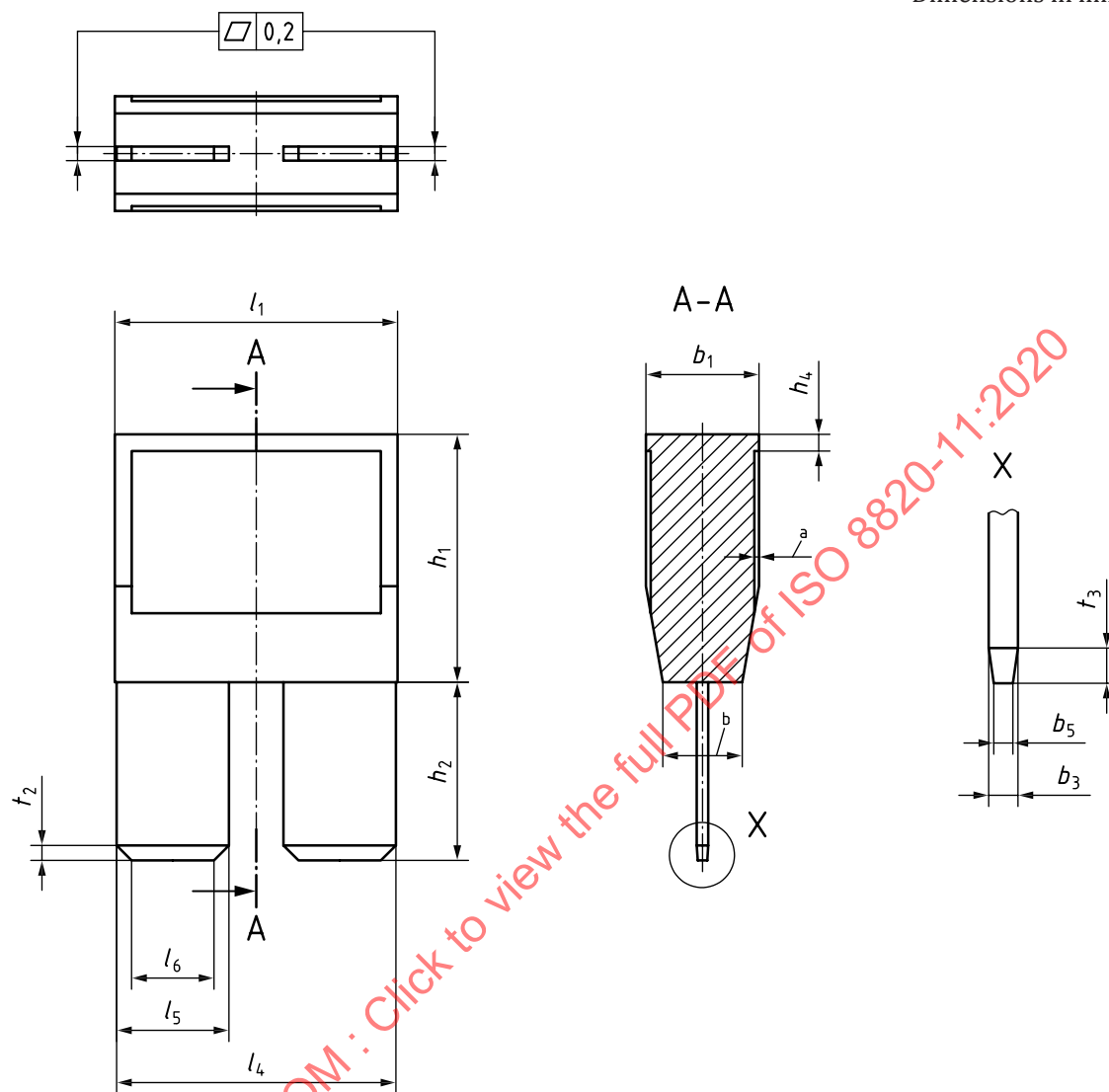
See [Annex A](#).

## 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

| Dimension | Value<br>(mm) | Tolerance<br>(mm) |
|-----------|---------------|-------------------|
| $l_1$     | 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<br>-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