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**Road vehicles — Fuse-links —**

Part 8:

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

*Véhicules routiers — Liaisons fusibles —*

*Partie 8: Liaisons fusibles avec contacts boulonnés (type H et J) à tension nominale de 450 V*

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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*.

This second edition cancels and replaces the first edition (ISO 8820-8:2012), which has been technically revised. The main changes compared to the previous edition are as follows:

- modification of [Table 7](#) - dimension of c, Type H, and
- editorial changes.

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 8:

# Fuse-links with bolt-in contacts (Type H and J) with rated voltage of 450 V

## 1 Scope

This document specifies fuse-links with bolt-in contacts (Type H and J) and test fixtures for the fuse-links for use in road vehicles. It establishes, for these fuse-link types, the rated current, test procedures, performance requirements and dimensions.

This document is applicable to fuse-links with a rated voltage of 450 V DC, a current rating of  $\leq 400$  A and a breaking capacity of 2 000 A intended for use in road vehicles.

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

ISO 6722-1, *Road vehicles — 60 V and 600 V single-core cables — Part 1: Dimensions, test methods and requirements for copper conductor cables*

## 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

The rated current, manufacturer's name or trademark and "450 V DC" shall be permanently marked on the fuse-link.

## 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:

All tests shall be performed as specified in [Table 1](#).

The test fixtures for electrical tests shall be designed in accordance with [Figure 4](#). The connection resistance shall be not higher than 0,35 mΩ to ensure the proper function of the test fixture. As two or more fuse-links are tested in series, they shall be mounted not less than 150 mm apart.

#### 5.1.2 Test sequence

**Table 1 — Test sequence**

No	Test		Clause	Sample group <sup>a</sup>						
				1	2	3	4	5	6	7
1	Dimensions		<a href="#">6</a>	X	X	X	—	—	—	—
2	Marking, labelling		<a href="#">4</a>	X	X	X	X	X	X	X
3	Strength of terminals		<a href="#">5.8</a>	X	X	X	X	X	X	X
4	Fuse-link voltage drop		<a href="#">5.2</a>	X	X	—	—	—	—	—
5	Environmental condition	Climatic load	<a href="#">5.4</a>	—	—	X	—	—	—	—
		Chemical loads		—	—	—	X	—	—	—
		Mechanical load		—	—	—	—	X	—	—
6	Transient current cycling		<a href="#">5.3</a>	—	—	—	—	—	X	—
7	Temperature rise		<a href="#">5.9</a>	—	—	—	—	—	—	X
8	Resistance against temperature shock		<a href="#">5.10</a>	—	—	—	—	—	—	X
9	Breaking capacity		<a href="#">5.7</a>	X	—	—	—	—	—	—
10	Fuse-link voltage drop		<a href="#">5.2</a>	— <sup>c</sup>	—	X	X	X	X	X
11	Operating time rating	1,1 I <sub>R</sub>	<a href="#">5.5</a>	—	X	X	X	X	X	X
		1,35 I <sub>R</sub>		—	Y <sup>b</sup>	Y	Y	Y	Y	Y
		1,5 I <sub>R</sub>		—	Y	Y	Y	Y	Y	Y
		2,0 I <sub>R</sub>		—	Y	Y	Y	Y	Y	Y
		3,0 I <sub>R</sub>		—	Y	Y	Y	Y	Y	Y
		5,0 I <sub>R</sub>		—	Y	Y	Y	Y	Y	Y
12	Strength of terminals		<a href="#">5.8</a>	X	X	X	X	X	X	X

<sup>a</sup> Each sample group shall contain a minimum of 10 fuse-links.

<sup>b</sup> For operating time rating, tests marked with “Y” in sample groups 2, 3, 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.

<sup>c</sup> For sample groups marked with “—” tests are not required.

#### 5.1.3 Test cable sizes

Test cable sizes shall be as given in [Table 2](#). 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.

Only thick wall cables as specified in ISO 6722-1 shall be used for testing.

**Table 2 — Test cable sizes**

Rated current, $I_R$ A	Conductor cross-sectional area <sup>a</sup> mm <sup>2</sup>	Cable length mm
10	2,0	500 ± 50
15		
20	3,0	
30	5,0	
40		
50		
60		
100	20,0	
125		
150	40,0	

<sup>a</sup> Conductor material is in accordance with ISO 6722-1.

## 5.2 Voltage drop

### 5.2.1 Tests

The voltage drop  $U_{12}$  shall be measured at points 1 and 2 across the fuse-link tabs as shown in [Figure 4](#) after carrying the rated current for 15 min.

### 5.2.2 Requirements

See [Table 3](#).

**Table 3 — Voltage drop**

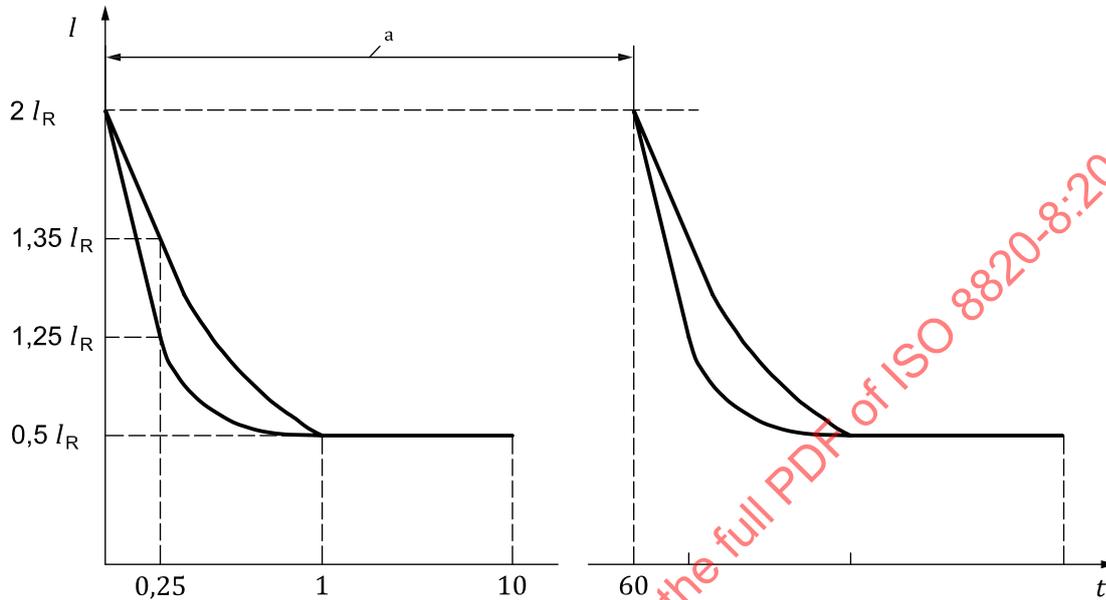
Rated current, $I_R$ A	Maximum voltage drop, $U_{12}$ mV		
	Type H	Type J	
10	— <sup>a</sup>	350	
15	200	— <sup>a</sup>	
20	— <sup>a</sup>	350	
30	200		
40		— <sup>a</sup>	
50		— <sup>a</sup>	250
60	200		
100			180
125			
150	— <sup>a</sup>		

<sup>a</sup> Not applicable.

### 5.3 Transient current cycling

#### 5.3.1 Test

See [Figure 1](#) 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  $0,5 I_R$ .



- Key**
- $t$  time (s)
  - $I$  current
  - $a$  One cycle.

**Figure 1**—Transient current cycling

#### 5.3.2 Requirements

After transient current cycling for 50 000 cycles, the fuse-link shall meet the values in appropriate [Tables 3](#) and [4](#).

### 5.4 Environmental conditions

See ISO 8820-1.

For chemical load tests, the samples shall not be immersed. A wipe test instead shall be agreed between fuse manufacturer and vehicle manufacturer.

### 5.5 Operating time-rating

#### 5.5.1 Test

Stabilize the test fixture and the fuse-links at room temperature prior to testing. After adjusting the power supply to the test current as specified in [Table 4](#), apply this current to the fuse-links. Then measure the time it takes the fuse-link to be activated. Especially when testing a large number of fuse-links, allow sufficient cooling time to prevent the test fixture from overheating.

The rated voltage  $U_R$  shall be maintained during a period of at least 30 s after the fuse-link is activated.

Table 4 — Operating times

Test current A	Operating time s					
	Fuse-links < 60 A		Fuse-links ≥ 60 A			
	Type H1, H2, H3 and J3		Type J1		Type J2 and J4	
	min.	max.	min.	max.	min.	max.
1,1 $I_R$	14 400	∞	14 400	∞	14 400	∞
1,35 $I_R^a$	150	3 600	— <sup>b</sup>	— <sup>b</sup>	150	3 600
1,5 $I_R$	10	1 000	5	3 600	20	1 500
2,0 $I_R$	0,5	100	1	300	1	300
3,0 $I_R$	0,1	15	0,2	30	0,2	30
5,0 $I_R$	0,05	1,0	0,05	1,0	0,05	1,0

NOTE The values given here are the total time values, including pre-arcing time and arcing time.

<sup>a</sup> For H1 fuse-links and J3 fuse-links rated 10 A and 20 A, this test is not required. They are intended for device protection only.

<sup>b</sup> Not applicable.

### 5.5.2 Requirement

The fuse-links shall meet the values given in [Table 4](#) and shall meet the requirements as given in ISO 8820-1. The fuse construction material shall stay inside within the body of the fuse-link.

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

### 5.6 Current steps

Not applicable.

### 5.7 Breaking capacity

#### 5.7.1 Test

A current of 2 000 A shall be applied to the fuse-links at a test voltage of 450 V DC. The test circuit shall be in accordance with ISO 8820-1.

Test cable sizes shall be in accordance with [Table 2](#).

#### 5.7.2 Requirement

After the test, insulators shall not be damaged. After activation, 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

#### 5.8.1 Test

Install the fuse-links in the test fixture (see [Figure 4](#)) with the mounting torque according to [Table 5](#). This test is performed without cables and terminals.

Table 5 — Mounting torque and bolt sizes

Fuse-link type	Mounting torque Nm	Bolt size
H1, H2	2 ± 0,5	M 4
H3	4,5 ± 1	M 5
J1, J2	6 ± 1	M 6
J3, J4	12 ± 1	M 8

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

NOTE Test number 12 in [Table 1](#) “Test sequence” is just a removal from the test fixture.

### 5.8.2 Requirements

The fuse-links shall remain physically intact.

## 5.9 Temperature rise

### 5.9.1 Test

The temperature rise shall be measured at the temperature-rise measuring points a or b in the standard test fixture as shown in [Figure 4](#) after supplying the test current as shown in [Table 6](#) for 40 min.

Table 6 — Test current

Rated current, $I_R$ A	Test current A
10	7
15	10,5
20	14
30	21
40	24
50	30
60	
100	50
125	62,5
150	75

### 5.9.2 Requirement

The temperature rise shall not exceed 50 °C.

## 5.10 Resistance against temperature shock

### 5.10.1 Test

See ISO 8820-1.

The fuse-links shall be subjected to 48 temperature shock cycles as follows (see [Figure 2](#)):

- a) 20 min at a temperature of  $(-40 \pm 2)$  °C;

- b) 15 s max. transition time;
- c) 20 min at the temperature of  $(100 \pm 2) ^\circ\text{C}$ ; and
- d) 15 s max. transition time.

After completion of the test, the operating time-rating test shall be conducted according to 5.7.

The above-described cycle a) through d) shall complete at 40 min.

### 5.10.2 Requirement

The fuse-link shall meet the values given in appropriate Table 3 and 4.

## 6 Dimensions

### 6.1 Type H

For the dimensions see Table 7 and Figure 2.

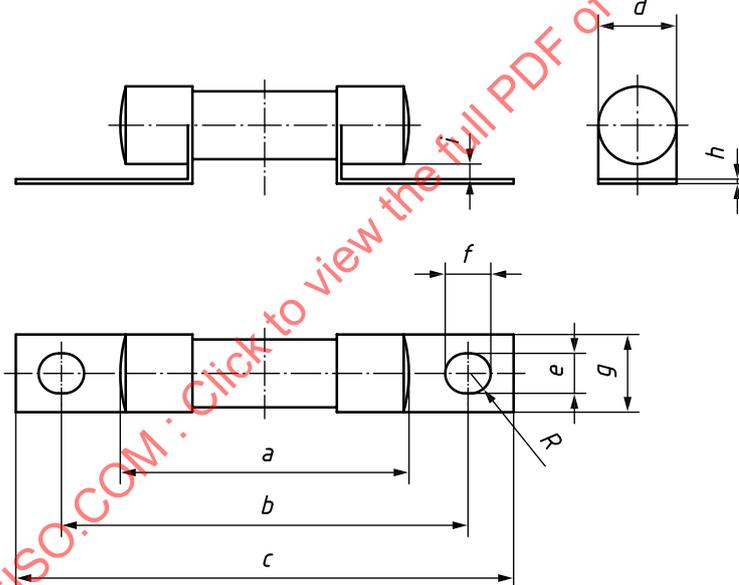


Figure 2 — Type H

Table 7 — Fuse-link Type H dimensions

Dimensions in millimetres

Dimension	H1		H2		H3	
	Value	Tolerance	Value	Tolerance	Value	Tolerance
<i>a</i>	31,8	$\pm 0,8$	38	$\pm 0,8$	38	$\pm 0,8$
<i>b</i>	45	$\pm 0,5$	51,2	$\pm 0,5$	53,5	$\pm 0,5$
<i>c</i>	55	$\pm 0,8$	61,2	$\pm 0,8$	64,5	$+0,8$ $-1,3$
<i>d</i>	6,45	$\pm 0,05$	6,6	$\pm 0,2$	10,3	$\pm 0,2$
<i>e</i>	4,2	$\pm 0,1$	4,2	$\pm 0,1$	5,3	$\pm 0,1$
<i>f</i>	5	$\pm 0,1$	5	$\pm 0,1$	6	$\pm 0,1$
<i>g</i>	10	$\pm 0,15$	10	$\pm 0,15$	10,3	$\pm 0,15$

Table 7 (continued)

Dimension	H1		H2		H3	
	Value	Tolerance	Value	Tolerance	Value	Tolerance
<i>h</i>	0,34	±0,16	0,34	±0,16	0,6	±0,16
<i>i</i>	2,5	±2,5	2,5	±2,5	2	±0,25

The currently available fuse links are listed in [Annex A](#)

### 6.2 Type J

For the dimensions see [Table 8](#) and [Figure 3](#).

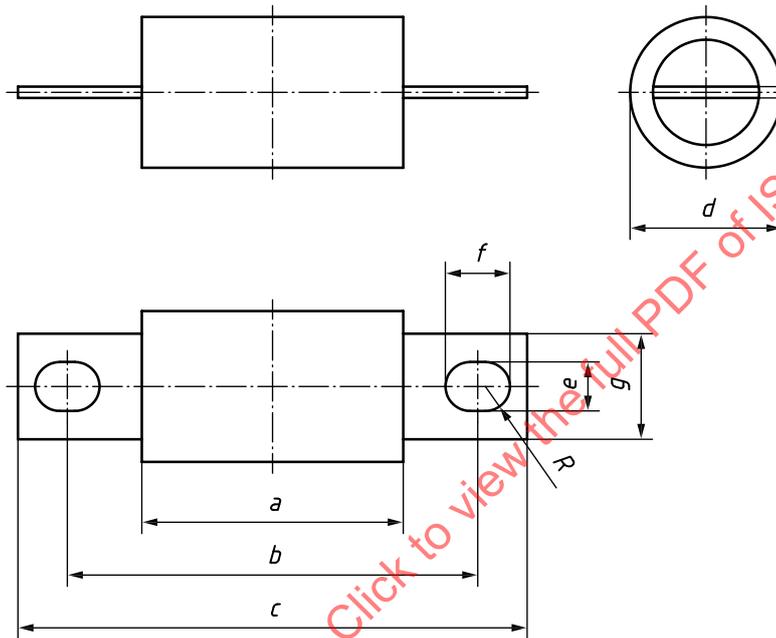


Figure 3 — Type J

Table 8 — Fuse-link Type J dimensions

Dimensions in millimetres

Dimension	J1		J2		J3		J4	
	Value	Tolerance	Value	Tolerance	Value	Tolerance	Value	Tolerance
<i>a</i>	34,4	±0,8	41,5	±1	41,3	±0,7	54	±0,7
<i>b</i>	54	±1	60	±0,5	60,45	±0,65	72,65	±0,75
<i>c</i>	67	±1	73	±0,5	81	±0,7	92,1	±0,7
<i>d</i>	20	±1	20	±0,5	20,6	±0,5	25,4	±0,5
<i>e</i>	6,5	±0,5	6,5	±0,3	8,7	±0,5	8,7	±0,5
<i>f</i>	8,5	±0,5	6,5	±0,3	11,85	±0,55	13,05	±0,55
<i>g</i>	14	±0,5	14,25	±0,25	18,3	±0,5	19	±0,5
<i>h</i>	1,5	±0,1	0,65	±0,15	3,2	±0,5	3,2	±0,5

The currently available fuse links are listed in [Annex A](#).