

Automotive parts - Bolt-in type high-voltage fuse-links

1 Scope

This standard specifies the bolt-in type fuse links (hereinafter referred to as "fuse-links"), with a rated current of 400 A or less, a rated voltage of 450 V and a breaking capacity of 2000 A, used in automotive DC high-voltage systems (60 to 450 V) for the purpose of driving/auxiliary driving.

2 Normative reference

The following standards contain which, thorough reference in this Standard, constitute provisions of this Standard. The most recent editions of the standard indicated below shall be applied.

JASO D611	Automotive parts - Low-tension cables with thin wall insulation for automobiles
JIS K 6258	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids
ISO 6722	Road vehicles - 60 V and 600 V single-core cables - Dimensions, test methods and requirements

3 Definitions

Definitions of main terms used in this standard shall be as follows.

3.1 Fuse-link

A replaceable part that consists of a conductive portion including a terminal and fuse-element and an insulator for electrical circuit protection.

3.1.1 Fuse-element

An operating portion of the fuse-link that shuts off the current by fusing at the time of the over current.

3.1.2 Terminal

A part of the fuse-link that connects the fuse-link to a fuseholder mechanically and electrically.

3.1.3 Insulator

A part of the fuse-link that has nonconductive characteristics to protect the fuse-element.

3.1.4 Fuseholder

A part to hold the fuse-link that is inserted into an electrical circuit.

3.2 Rated current I_R

A current value to be used for classification of fuse-links in the test specified in this standard. A carry current that is normally used is smaller than the rated current.

3.3 Rated voltage

The maximum voltage at which a fuse-link can be used.

3.4 Voltage drop U_d

A voltage between terminals of the fuse-link itself measured under specified conditions after the rated current is continuously applied for a specified time.

3.5 Time constant

A time required for a physical quantity to increase from zero to $1-1/e$ (i.e. 63.2 %) of its final constant value in the case that a time t of $1-e^{-kt}$ changes.

4 Types

Table 1 shows types of fuse-links according to their rated current and shape.

Table 1 Types

Rated current A \ Shape	Type H		Type I			
	H1	H2	I1	I2	I3	I4
10	-	-	-	-	○	-
15	○	-	-	-	-	-
20	-	-	-	-	○	-
30	-	○	-	-	○	-
100	-	-	○	-	-	○
125	-	-	○	○	-	-
Note ○: Applicable, -: Not applicable						

5 Requirements

5.1 General

Fuse-links shall satisfy the performance requirement mentioned in **5.2** when they are tested according to the method mentioned in **6**. In addition, marking on the fuse-links shall be read after the test.

5.2 Performance

The performance of fuse-links shall be in accordance with **5.2.1** through **5.2.9**.

5.2.1 Voltage drop

The maximum voltage drop shall be measured according to **6.3.1** and it shall not exceed the value shown in **Table 2**.

Table 2 Maximum voltage drop

Rated current of fuse-link I_R A	Maximum voltage drop mV	
	Type H	Type I
10	-	350
15	200	-
20	-	350
30	200	350
100	-	250
125		200

5.2.2 Transient current intermittent cycle durability

After the fuse-links are tested according to **6.3.2**, they shall satisfy the values shown in **Tables 2** and **3**.

5.2.3 Vibration durability

After the fuse-links are tested according to **6.3.3**, they shall satisfy the values shown in **Tables 2** and **3**.

5.2.4 Environment resistance**5.2.4.1 Temperature and humidity cycle**

After the fuse-links are tested according to **6.3.4.1**, they shall satisfy the values shown in **Tables 2** and **3**.

5.2.4.2 Lubricant resistance

After the fuse-links are tested according to **6.3.4.2**, they shall satisfy the values shown in **Tables 2** and **3**.

5.2.4.3 Fuel oil resistance

After the fuse-links are tested according to **6.3.4.3**, they shall satisfy the values shown in **Tables 2** and **3**.

5.2.5 Temperature rise

When the fuse-links are tested according to **6.3.5**, the temperature rising values of the fuse-links shall not exceed 50 deg.

5.2.6 Thermal shock resistance

After the fuse-links are tested according to **6.3.6**, they shall satisfy the values shown in **Tables 2** and **3**.

5.2.7 Fusing time

When the fuse-links are tested according to **6.3.7**, they shall satisfy the values shown in **Table 3** and no ignition, breaking or deformation shall be allowed during the test. The insulation resistance between both terminals of the fuse-links after fusing shall be 1 MΩ or more.

Table 3 Fusing time

Test current A	Fusing time s			
	I_R : Less than 60 A		I_R : 60 A min	
	min.	max.	min.	max.
1.1 I_R	14 400	∞	14 400	∞
2.0 I_R	0.5	100	1	300
3.0 I_R	0.1	15	0.2	30
5.0 I_R	0.05	1.0	0.05	1.0

5.2.8 Breaking capacity

When the fuse-links are tested according to **6.3.8**, they shall completely break the circuit. The insulation resistance between both terminals of the fuse-links after fusing shall be 1 MΩ or more.

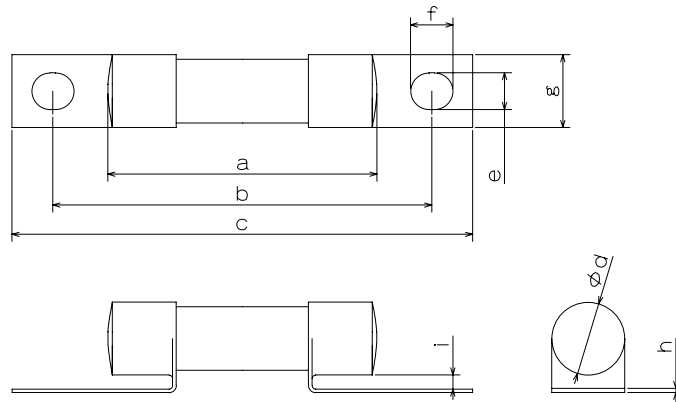
5.2.9 Strength of fuse-links

When the fuse-links are tested according to **6.3.9**, no abnormality shall be allowed when they are tightened. When they are removed, they shall be possible to remove them from the test equipment.

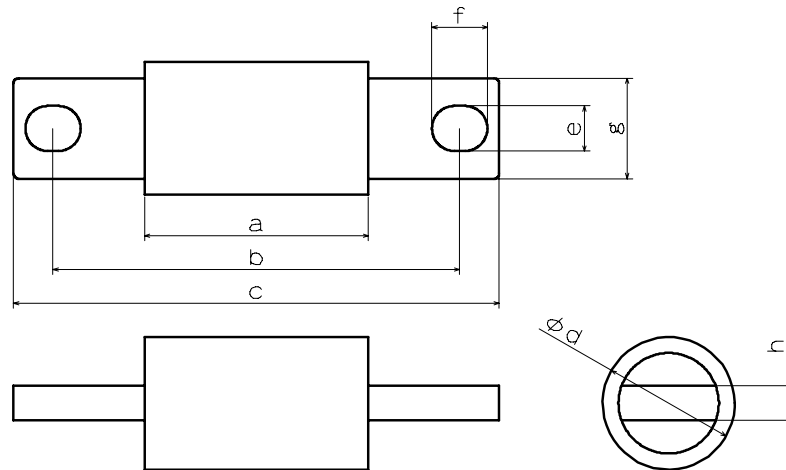
5.3 Shapes and dimensions

See **Figure 1** for basic shapes and dimensions of fuse-links.

Type H



Type I



Unit: mm

Type	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>
H1	31.0 to 32.6	44.5 to 45.5	54.2 to 55.8	6.4 to 6.5	4.1 to 4.3	4.9 to 5.1	9.85 to 10.15	0.18 to 0.5	0 to 5.0
H2	37.2 to 38.8	50.7 to 51.7	60.4 to 62.0	6.4 to 6.8	4.1 to 4.3	4.9 to 5.1	9.85 to 10.15	0.18 to 0.5	0 to 5.0
I1	33.6 to 35.2	53.0 to 55.0	66.0 to 68.0	19.0 to 21.0	6.0 to 7.0	8.0 to 9.0	13.5 to 14.5	1.4 to 1.6	-
I2	40.5 to 42.5	59.5 to 60.5	72.5 to 73.5	19.5 to 20.5	6.2 to 6.8	6.2 to 6.8	14.0 to 14.5	0.5 to 0.8	-
I3	40.6 to 42.0	59.8 to 61.1	80.3 to 81.7	20.1 to 21.1	8.2 to 9.2	11.3 to 12.4	17.8 to 18.8	2.7 to 3.7	-
I4	53.3 to 54.7	71.9 to 73.4	91.4 to 92.8	24.9 to 25.9	8.2 to 9.2	12.5 to 13.6	18.5 to 19.5	2.7 to 3.7	-

Figure 1 Shapes and dimensions