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Road vehicles — Fuse-links —

Part 5: Fuse-links with axial terminals (Strip fuse-links) Types SF 30 and SF 51 and test fixtures

Véhicules routiers — Liaisons fusibles —

Partie 5: Liaisons fusibles avec languettes axiales (liaisons fusibles électriques) des types SF 30 et SF 51, et montages d'essai

Reference number
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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).

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary Information

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electric and electronic equipment*.

This second edition cancels and replaces the first edition (ISO 8820-5:2007), 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 guidelines*

— *Part 3: Fuse-link 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*

— *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 K)*

— *Part 10: Fuse-links with tabs Type L (high current miniature)*

Road vehicles — Fuse-links —

Part 5:
Fuse-links with axial terminals (Strip fuse-links) Types SF 30 and SF 51 and test fixtures

1 Scope

This part of ISO 8820 specifies fuse-links with axial terminals (Strip fuse-links) Type SF 30 and SF 51 and test fixtures for fuses 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 to fuse-links with a rated voltage of 32 V, a current rating of 30 A to 500 A, and a breaking capacity of 2 000 A intended for use in the electrical system of road vehicles with a nominal voltage of 12 V and/or 24 V.

This part of ISO 8820 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 part of ISO 8820.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4017, *Fasteners — Hexagon head screws — Product grades A and B*

ISO 4032, *Hexagon regular nuts (style 1) — Product grades A and B*

ISO 7089, *Plain washers — Normal series — Product grade A*

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

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

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

The requirements given in Table 1 and ISO 8820-1 shall apply.

Table 1 — Fuse-link colour coding

Fuse-link current rating A	Fuse-link type SF 30	Fuse-link type SF 51
30	orange	
40	green	
50	red	
60	yellow	
70	brown	
80	white	red
100	blue	yellow
125	pink	green
150	grey	orange
175	light brown (tan)	white
200	violet	blue
225		light brown (tan)
250		pink
300		grey
350		dark green
400		violet
450		gold/dark yellow
500		brown

5 Tests and requirements

5.1 General

5.1.1 General test conditions

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 4 to Figure 7. The connection resistance shall be a maximum of 1,0 mΩ for SF 30 fuse-links and a maximum of 0,35 mΩ for SF 51 fuse-links to ensure the proper function of the test fixture;

— terminals shall have a suitable finish which will ensure corrosion protection and shall have satisfactory mechanical and electrical properties.

Fuse-link type SF 30 with a rated current of 150 A...200 A and fuse-link type SF 51 with a rated current of 300 A ... 500 A shall only be used for short circuit protection and have to be tested with a cable, the insulation of which will withstand the test without deterioration.

5.1.2 Test sequence

Table 2 — Test sequence

No	Test		Clause	Sample groups[a]						
				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	Terminal strength		5.8	X	X	X	X	X	X	X
4	Fuse-link voltage drop		5.2	X	X	X				
5	Climatic load		5.4				X			
6	Chemical load		5.4					X		
7	Mechanical load		5.4						X	
8	Transient current cycling		5.3							X
9	Fuse-link voltage drop		5.2				X	X	X	X
10	Current step		5.6			X				
11	Breaking capacity		5.7	X						
12	Operating time rating	0,75 I_R, 1,0 I_R, or 1,1 I_R	5.5		X		X	X	X	X
		1,35 I_R or 1,5 I_R			Y[b]		Y	Y	Y	Y
		2,0 I_R			Y		Y	Y	Y	Y
		3,0 I_R or 3,5 I_R			Y		Y	Y	Y	Y
		5,0 I_R or 6,0 I_R			Y		Y	Y	Y	Y
13	Terminal strength (removal)		5.8	X	X	X	X	X	X	X

[a] Each sample group shall contain a minimum of eight fuse links.

[b] For these operating time tests noted with a Y, the sample groups 2, 4, 5, 6, and 7 each current rating shall be divided equally. These fuses 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 does not necessarily indicate the size of cable to be used in the vehicle application.

Table 3 — Test cable sizes

Current rating A	Conductor cross sectional area[a] mm^2	
	for fuse-link types SF 30	fuse-link types SF 51
30	2,5	
40	4,0	
50	6,0	
60		
70	10,0	
80		10,0
100	16,0	16,0
125	25,0	
150		25,0
175		
200		35,0
225		
250		50,0
300		70,0
350		
400		
450		
500		

[a] Conductor material according ISO 6722.

5.2 Voltage drop

5.2.1 Purpose

This test defines and measures the energy consumption of the fuse-link which creates a temperature rise.

5.2.2 Test

The test given in ISO 8820-1 shall apply. Measure the voltage drop at the points as indicated (see Figure 4 to Figure 6) using the test fixtures of Clause 7.

This test shall be performed at 0,75 I_R for the following:

— SF 30 - 150A ... 200 A;

— SF 51 - 300 A ... 500A.

5.2.3 Requirement

The requirements given in Table 4 shall apply.

Table 4 — Voltage drop

Current rating A	Max voltage drop mV	
	for fuse-link types SF 30	fuse-link types SF 51
30	105	
40	90	
50	80	
60		
70		
80	75	110
100		
125		
150	70	
175		
200		
225		80
250		
300		
350		
400		
450		
500		

5.3 Transient current cycling

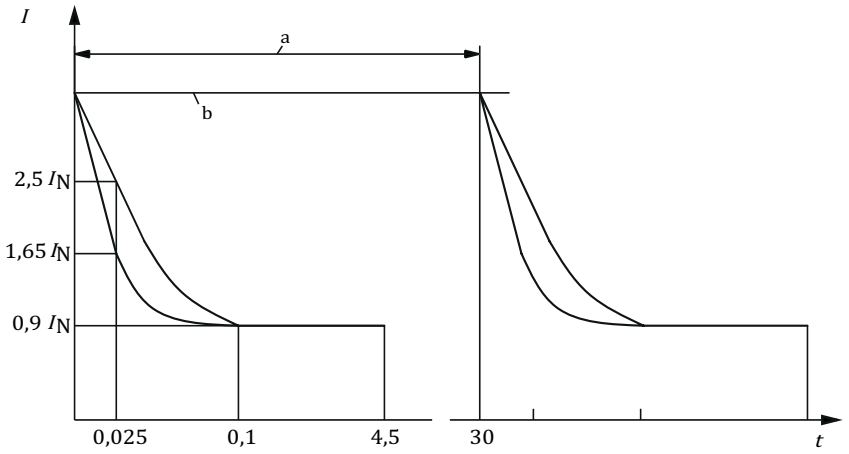
5.3.1 Purpose

This test evaluates the ability of the fuse-link to withstand the energy volume of transient pulses.

5.3.2 Test

Figure 1 and the test given in ISO 8820-1 shall apply. 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 shall the steady-state current fall below 0,9 I_R.

This test does not apply to fuse-links type SF 30 current ratings of 150 A and above and type SF 51 current ratings of 300 A and above. For those fuse-links, agreements have to be taken between manufacturer and supplier.



Key

I current

t time in s

a One cycle.

b Initial applied current 4,0 I_R.

Figure 1 — Transient current cycling

5.3.3 Requirement

The requirements given in ISO 8820-1 shall apply.

5.4 Environmental conditions

The tests and requirements given in ISO 8820-1 shall apply

5.5 Operating time rating

5.5.1 Purpose

This test evaluates the ability of the fuse-links to function when subjected to electrical overloads.

5.5.2 Test

The test given in ISO 8820-1 shall apply.

5.5.3 Requirements

The requirements given in Table 5 shall apply.

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 currents	Operating times s							
	SF 30				SF 51			
	30 A ... 125 A		150 A ... 200 A		80 A ... 250 A		300 A ... 500 A	
	min	max	min	max	min	max	min	max
0,75 I_R	—[b]	—	360 000	∞	—	—	14 400	∞
I_R	360 000	∞	—	—	14 400	∞	—	—
1,1 I_R	14 400	∞	—	—	—	—	—	—
1,35 I_R	—	—	—	—	120	1 800	—	—
1,5 I_R	90	3 600	—	—	—	—	—	—
2,0 I_R	3	100	1	15	1	15	1	15
3,0 I_R	0,3	3	—	—	—	—	—	—
3,5 I_R	—	—	0,3	5	0,3	5	0,5	5
5,0 I_R	0,1	1	—	—	—	—	—	—
6,0 I_R[a]	—	—	0,1	1	0,1	1	0,1	1

[a] Not for ≥350 A.

[b] Not specified.

5.6 Current steps

5.6.1 Purpose

This test evaluates the ability of the fuse-links' components to withstand the prolonged heating due to low level overloads.

5.6.2 Test

The test given in ISO 8820-1 shall apply.

NOTE This test does not apply for fuse types SF 30 – 150 A to 200 A ... SF 51 – 300 A ... 500 A.

5.6.3 Requirements

The requirement given in ISO 8820-1 shall apply. 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 Purpose

This test evaluates the ability of the fuse-links to withstand the rated breaking current.

5.7.2 Test

The test given in ISO 8820-1 shall apply.

Test at 2 000 A with cable sizes as shown in Table 3.

5.7.3 Requirement

The requirement given in ISO 8820-1 shall apply. 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

5.8.1 Purpose

This test evaluates the ability of the fuse-links to withstand mechanical stress during insertion and removal.

5.8.2 Test

Install the fuse-links in the test fixture (see Figure 4 to Figure 6) with the mounting torque according to Table 6. This test is performed without cables and terminals.

Table 6 — Mounting torque

Fuse-link type	Mounting torque Nm
SF 30 – for M5 bolts	4,5 ± 1
SF 30 – for M6 bolts	6 ± 1
SF 51 – for M8 bolts	12 ± 1

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 13 in Table 2 is just a removal from the test fixture.

5.8.3 Requirement

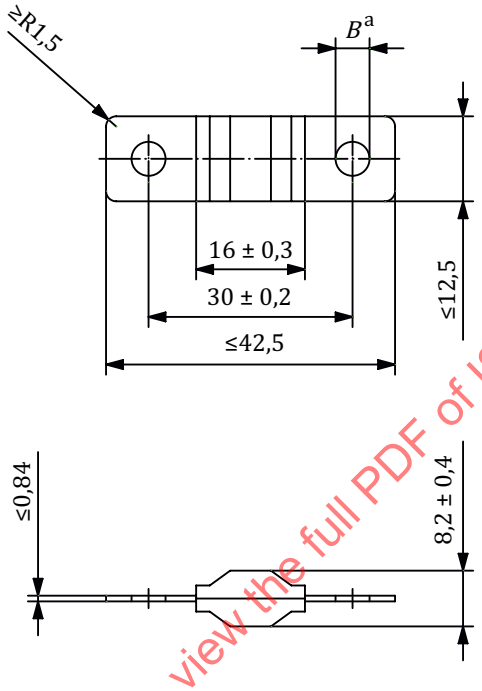
Fuse-links shall remain physically intact.

6 Dimensions and designation examples

6.1 Type SF 30

6.1.1 Dimensions

Dimensions in millimetres



Key

B For fuse links with rated current ≤125 A, the hole B is for a bolt diameter of M5 and/or M6 and for fuse-links with a rated current >125 A, the hole B is for a bolt diameter of M6

NOTE SF 30 fuses might have a hole which fits for a bolt diameter M5 or M6.

Figure 2 — Fuse-link type SF 30

6.1.2 Designation example

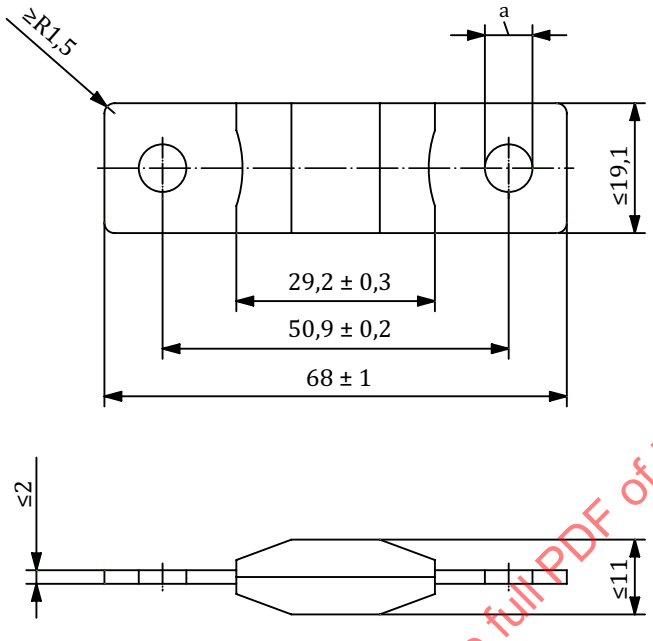
An example of the designation of a fuse-link type SF 30 for a rated current of 100 A and M6 bolt is

Fuse ISO 8820-SF 30-100-M6

6.2 Type SF 51

6.2.1 Dimensions

Dimensions in millimetres



Key

a For bolt M8.

Figure 3 — Fuse-link type SF 51

6.2.2 Designation example

An example of the designation of a fuse-link type SF 51 for a rated current of 150 A is

Fuse ISO 8820-SF 51-150

7 Test fixture

7.1 General

This Clause establishes the overall dimensions, materials, finish, and coatings for the test fixture to perform electrical tests on fuse-links as specified herein.

7.2 Materials and dimensions

The test fixture shall conform to the material requirements and dimensions shown in Table 7 to Table 9 and Figure 4 to Figure 7. Alternative designs of test fixture are allowed in the case that the electrical and mechanical properties are equivalent.

Table 7 — Parts list and material specifications for M5 bolts

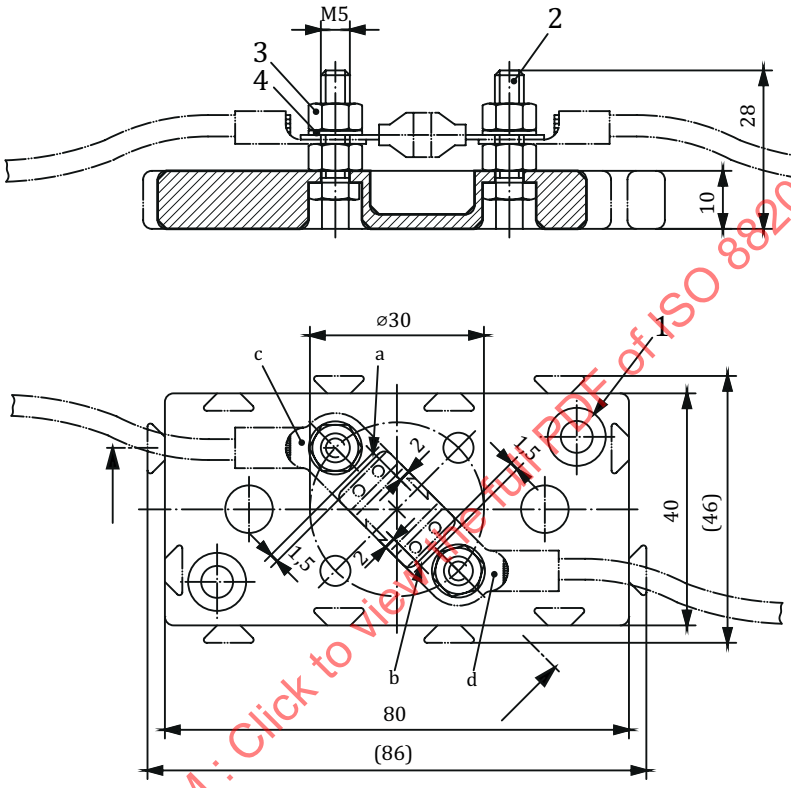
Reference no. in Figure 4	Description	Dimensions (see Figure)	Material specifications, finish, and coating	Quantity
1	Test fixture insulating body	7	Thermoset plastic	1
2	Bolt: ISO 4017-M5x20–8.8	—	Steel, gal. Zn	2

Table 7 *(continued)*

Reference no. in Figure 4	Description	Dimensions (see Figure)	Material specifications, finish, and coating	Quantity
3	Nut: ISO 4032-M5–8	—	Steel, gal. Zn	4
4	Washer ISO 7089-5-200 HV	—	Steel, gal. Zn	2

Dimensions in millimetres

Tolerances: in accordance with ISO 2768



Key

1 Test fixture insulating body
2 Bolt: ISO 4017-M5x20-8,8
3 Nut: ISO 4032-M5-8
4 Washer: ISO 7089-5-200 HV

NOTE 1 Points a and b are measuring points for the voltage drop.

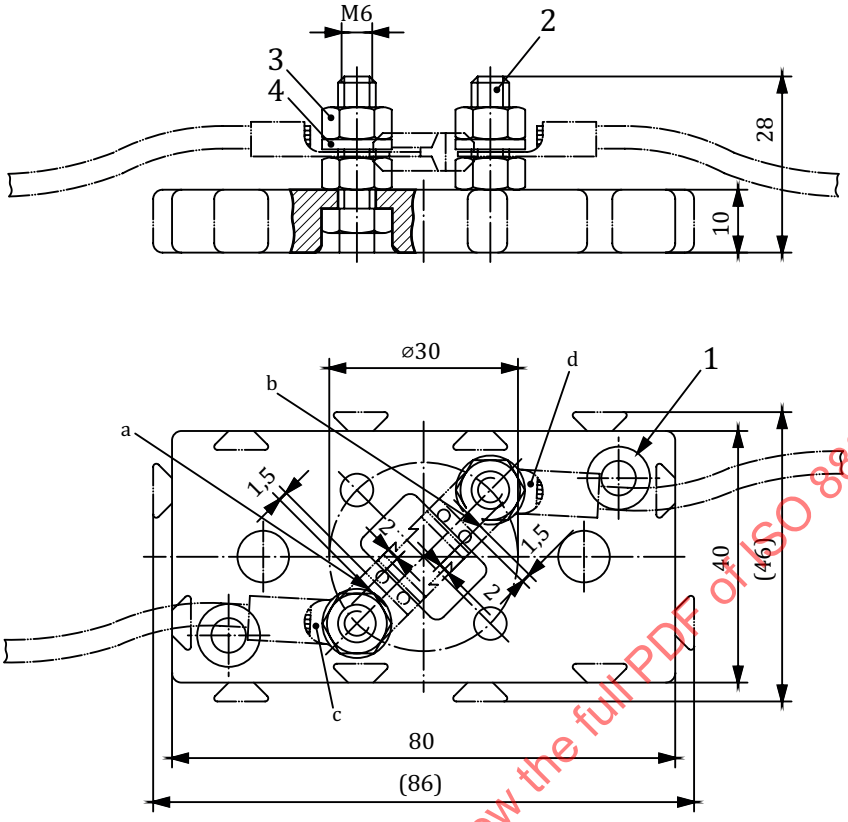
NOTE 2 Points a, c and b, d are the measuring points for connection resistance.

Figure 4 — Test fixture with M5 bolts for type SF 30 fuse-links

Table 8 — Parts list and material specifications with M6 bolts

Reference no. in Figure 5	Description	Dimensions (see Figure)	Material specifications, finish, and coating	Quantity
1	Test fixture insulating body	7	Thermoset plastic	1
2	Bolt: ISO 4017-M6x20–8.8	—	Steel, gal. Zn	2
3	Nut: ISO 4032-M6–8	—	Steel, gal. Zn	4
4	Washer: ISO 7089-6-200HV	—	Steel, gal. Zn	2

Dimensions in millimetres
Tolerances in accordance with ISO 2768



Key

1 Test fixture insulating body
2 Bolt: ISO 4017-M6x20-8,8
3 Nut: ISO 4032-M6-8
4 Washer: ISO 7089-5-200 HV

NOTE 1 Points a and b are measuring points for the voltage drop.

NOTE 2 Points a, c and b, d are the measuring points for connection resistance.

Figure 5 — Test fixture with M6 bolts for type SF 30 fuse-links

Table 9 — Parts list and material specifications with M8 bolts

Reference no. in Figure 6	Description	Dimensions (see Figure)	Material specifications, finish, and coating	Quantity
1	Test fixture insulating body	7	Thermoset plastic	1
2	Bolt: ISO 4017-M8x30–8.8	—	Steel, gal. Zn	2
3	Nut: ISO 4032-M8–8	—	Steel, gal. Zn	4
4	Washer: ISO 7089-8-200HV	—	Steel, gal. Zn	2