INTERNATIONAL STANDARD

ISO 8820-1

First edition
1994-08-15

Road vehicles — Blade-type electric fuse-links —

Part 1:
Rated current, identification, test procedures and performance requirements

Véhicules routiers — Fusibles électriques plats —
Partie 1: Intensité nominale, identification, méthodes d'essai et exigences de performance

Reference number
ISO 8820-1:1994(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8820-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 8820 consists of the following parts, under the general title *Road vehicles — Blade-type electric fuse-links*:

— *Part 1: Rated current, identification, test procedures and performance requirements*

— *Part 2: Dimensions*

— *Part 3: Test fixture*

Annex A forms an integral part of this part of ISO 8820.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland
Printed in Switzerland

Road vehicles — Blade-type electric fuse-links —

Part 1:
Rated current, identification, test procedures and performance requirements

1 Scope

This part of ISO 8820 establishes the rated current, identification, test procedures and performance requirements for blade-type electric fuse-links with rated currents up to and including 30 A, used to protect on-board wiring harnesses and electrical equipment, with a rated voltage up to and including 32 V, of road vehicles and similar applications from overcurrent. Interruption of the circuit is achieved as a result of the fuse element melting.

Dimensions for blade-type electric fuse-links are specified in ISO 8820-2 and the test fixture in ISO 8820-3.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8820. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8820 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1337:1980, *Wrought coppers (having minimum copper contents of 99,85 %) — Chemical composition and forms of wrought products.*

ISO 1817:1985, *Rubber, vulcanized — Determination of the effect of liquids.*

ISO 6722-3:1993, *Road vehicles — Unscreened low-tension cables — Part 3: Conductor sizes and dimensions for thick-wall insulated cables.*

ISO 6722-4:1993, *Road vehicles — Unscreened low-tension cables — Part 4: Conductor sizes and dimensions for thin-wall insulated cables.*

ISO 8820-3:1994, *Road vehicles — Blade-type electric fuse-links — Part 3: Test fixture.*

IEC 291:1969, *Fuse definitions.*

IEC 809:1985, *Lamps for road vehicles — Dimensional, electrical and luminous requirements.*

3 Definitions

For the purposes of all parts of ISO 8820, the definitions given in IEC 291 apply.

4 Rated current and identification

4.1 The rated current shall be permanently marked on the top face of the fuse-link body as the principal means of identification. Secondary identification of current rating shall be by colour coding in accordance with table 1.

4.2 The manufacturer's name, mark or symbol shall be marked on the fuse-link body.

4.3 The maximum operating voltage shall be shown on the fuse-link body.

4.4 The electrical state of the fuse-link shall be visible.

Table 1 — Colour coding

Rated current A	Colour
1	Black
2	Grey
3	Violet
4	Pink
5	Light brown
7,5	Brown
10	Red
15	Light blue
20	Yellow
25	Natural (white)
30	Light green

5 Test procedures

5.1 General

All fuse-links covered by this part of ISO 8820 shall comply with the performance requirements of clause 6 when tested in accordance with the following procedures.

Except as noted for the vibration and accelerated ageing tests, the fuse-links shall be mounted in the horizontal plane.

Make all electrical tests with direct current maintained within a tolerance of ± 1 %, at an ambient temperature of (23 ± 5) °C unless otherwise stated.

Mount the fuse-links in a standard test fixture as outlined in figure 1, and specified in ISO 8820-3, or any alternative fixture with equivalent electrical and mechanical properties. Connections, except as noted in 5.4, shall be made to the fuse-links by not less than 600 mm of copper cable of 4 mm^2 cross-sectional area conforming to ISO 6722-3 and ISO 6722-4. When two or more fuse-links are tested in series, they shall be mounted not less than 150 mm apart.

The interface voltage drop V_{cd} to V_{ab}[1)] of the test fixture shall not exceed 2 mV/A. The total voltage drop V_{ef}[1)] shall not exceed 4 mV/A.

Make the voltage checks using either a fuse-link or a solid copper alloy dummy in accordance with ISO 1337, Type Cu - EPT (UNS C11000), with the dimensions shown in figure 2.

Make vibration and environmental exposure tests without current passing through the fuse-links.

5.2 Voltage drop

Measure the voltage drop, expressed in millivolts, at points "a" and "b" across the fuse-link terminals as shown in figure 1, after 15 min of applied rated current.

5.3 Current cycling test

Subject the fuse-link under test to current cycling as shown in figure 3, using a stabilized current source.

5.4 Transient current cycling test

Apply a resistive load to adjust the initial peak transient current to the percentage of fuse-link rating as shown in figure 4 and the initial steady-state current to 100 % of the fuse-link rated current I_N.

If this is achieved through the use of lamp bulbs as the load, the bulbs shall conform to IEC 809 or equivalent. It is acceptable if current levels fall below the initial set current value during current cycling as a result of bulb ageing. Replace burned-out bulbs during the test. At no time shall the steady state current fall below 90 % I_N. Use a test voltage of (14 ± 0,2) V.

1) The terms V_{cd} to V_{ab} and V_{ef} refer to the measuring points in figure 1.

Dimensions in millimetres

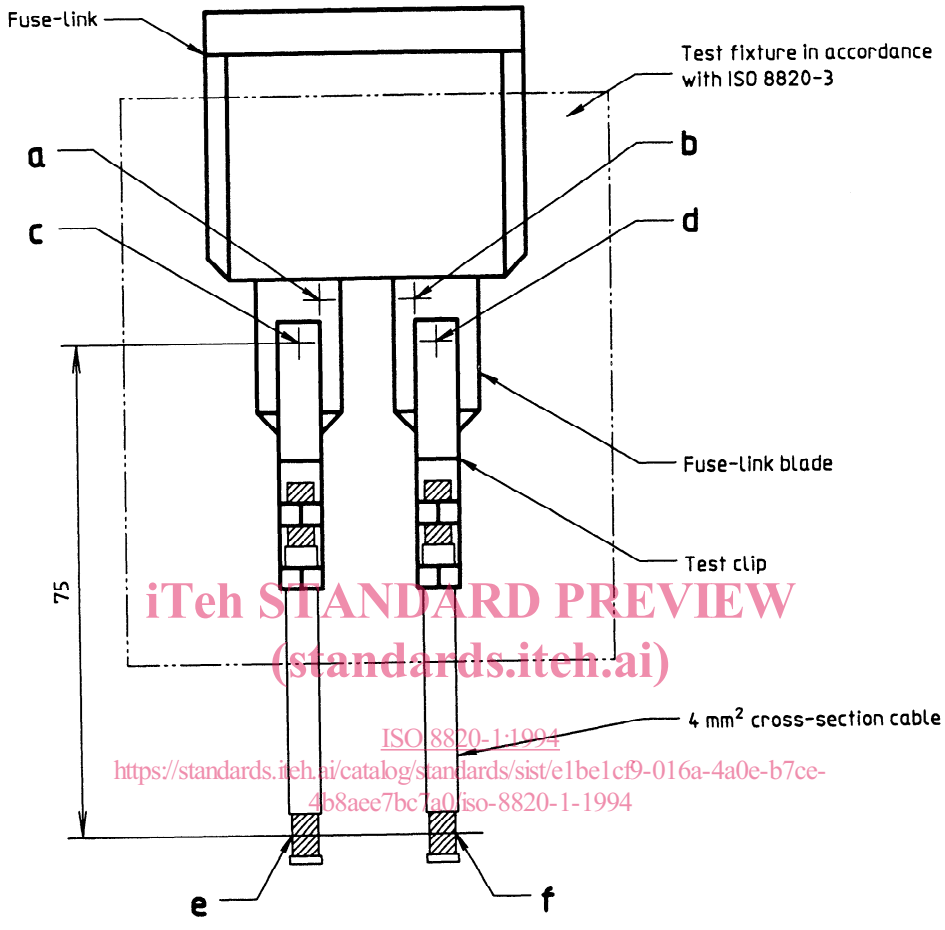


Figure 1 — Test layout

Dimensions in millimetres

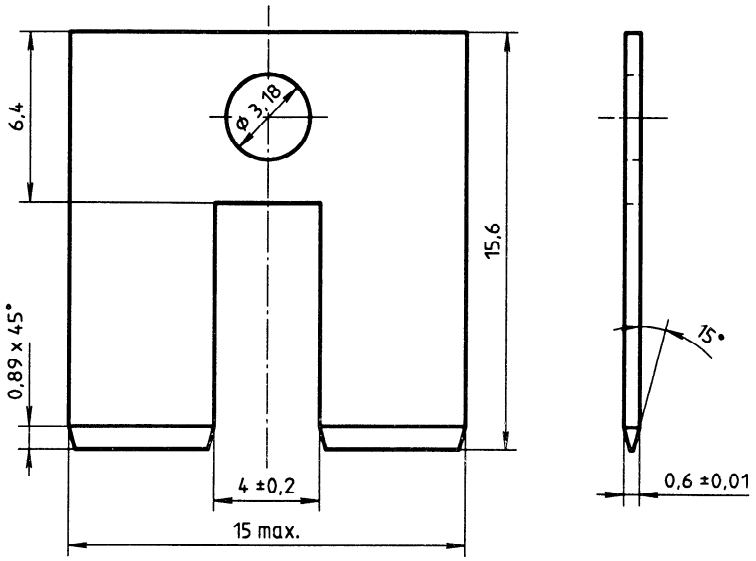


Figure 2 — Test slug

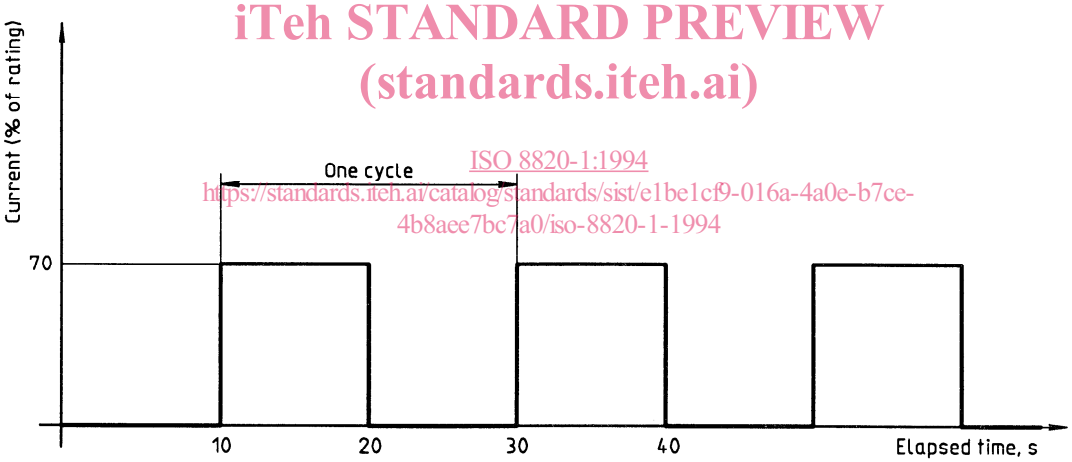


Figure 3 — Current cycling

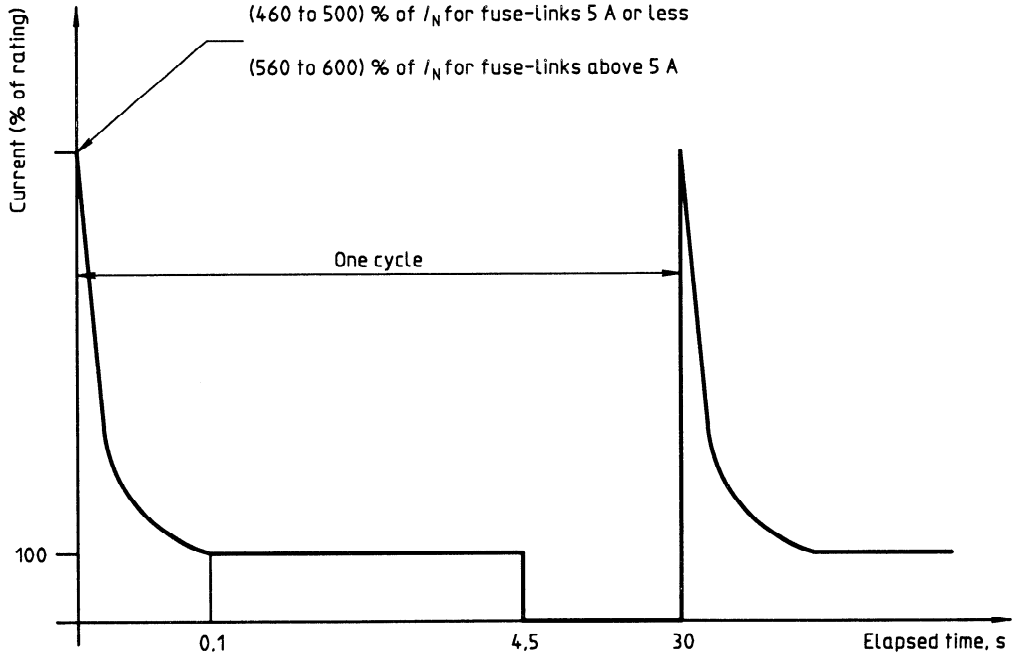


Figure 4 — Transient current cycling

5.5 Vibration test

Subject suitably mounted samples to a simple harmonic motion having an amplitude of 0,75 mm travel (1,5 mm peak-to-peak). Vary the frequency uniformly between the limits of 10 Hz and 55 Hz. The entire range increasing from 10 Hz to 55 Hz and returning to 10 Hz shall be traversed in approximately 1 min. Apply the motion for 2 h in each of the three mutually perpendicular directions, two of which shall be horizontal.

NOTE 1 Additional or alternative test procedures may be mutually agreed between the fuse-link and vehicle manufacturers.

5.6 Environmental exposure

5.6.1 Accelerated ageing test

Subject the fuse-links to a temperature/humidity cycling test as specified in figure 5. The sequence of the test is as follows.

a) Hold the samples at room (chamber) temperature (t_c) (23 ± 5) °C for 4 h at 45 % to 75 % relative humidity (RH).

b) Raise t_c to (80 ± 2) °C at 95 % to 99 % RH within 0,5 h.

c) Hold t_c at (80 ± 2) °C at 95 % to 99 % RH for 10 h.

d) Lower t_c to (− 40 ± 2) °C within 2,5 h.

e) Hold t_c at (− 40 ± 2) °C for 2 h.

f) Raise t_c to (120 ± 2) °C within 1,5 h from (− 40 ± 2) °C.

g) Hold t_c at (120 ± 2) °C for 2 h.

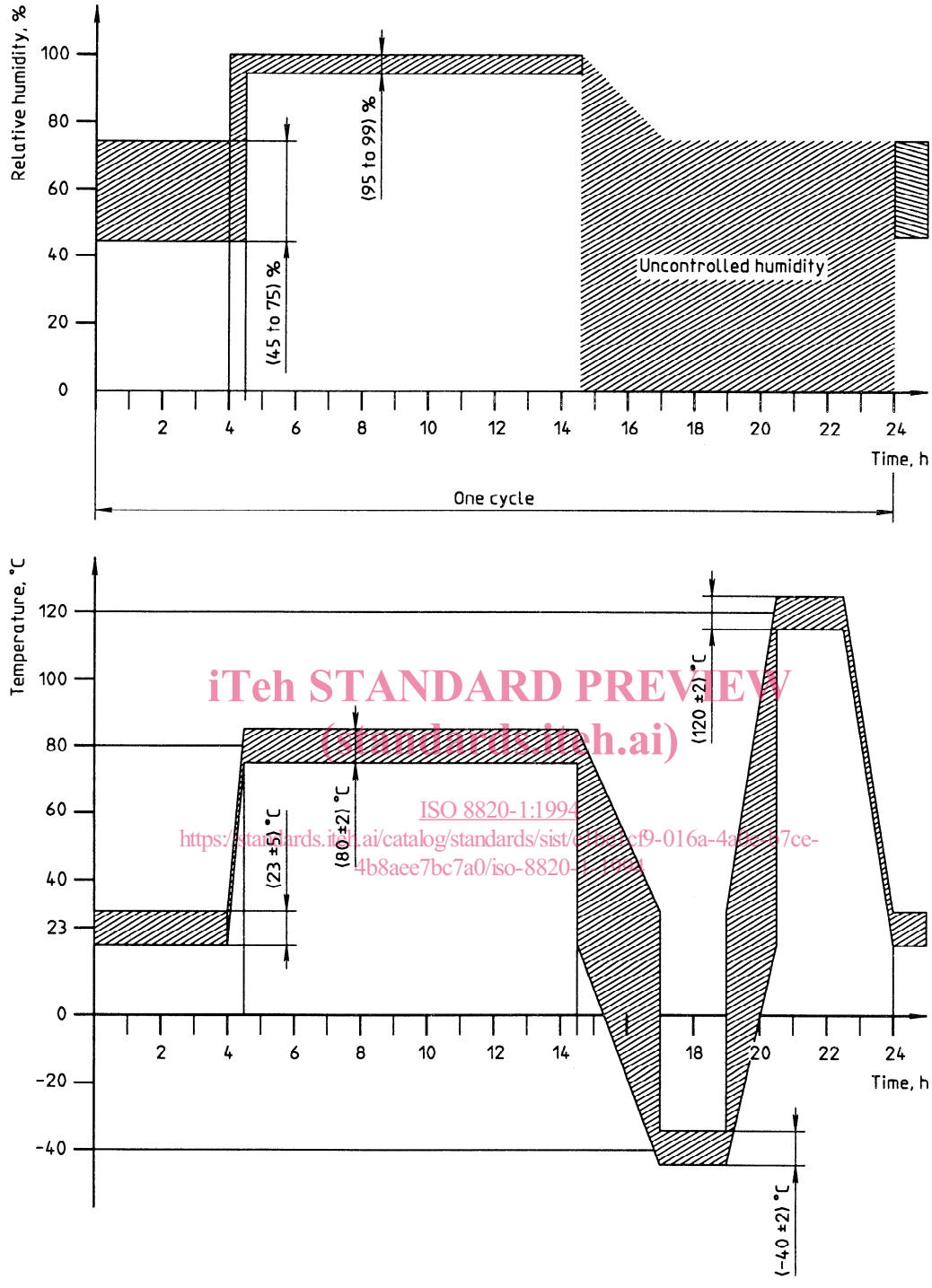
h) Allow to return to room temperature (23 ± 5) °C within 1,5 h.

NOTES

2 One cycle consists of 24 complete hours.

3 For periods d), e), f), g) and h), the humidity is uncontrolled.

4 At weekends, samples should remain in the humidity cabinet at room temperature.



Hatched areas indicate allowed temperature/humidity/time tolerances.

Figure 5 — Temperature/humidity cycling

5.6.2 Fluid compatibility

5.6.2.1 Resistance to oil

Immerse the fuse-links in No. 1 oil as specified in ISO 1817 at a temperature of (23 ± 5) °C. After 1 min, remove the samples and subject them to a temperature of (90 ± 2) °C for 1 h.

Drain all liquid from the fuse-link prior to checking the electrical test requirements in 6.5.2.1.

5.6.2.2 Resistance to fuel

Immerse the fuse-links in fuel "C" as specified in ISO 1817 at a temperature of (23 ± 5) °C. After 1 min, remove the samples and dry them at a temperature of (90 ± 2) °C for 1 h.

5.7 Operating time rating test

Stabilize a test fixture and fuse-link at (23 ± 5) °C prior to testing. Adjust the power supply to the test current specified in table 2. Then apply this current to the fuse-link. Repeat this procedure for each sample. Allow sufficient cooling time, especially when testing a large number of fuse-links, to prevent excessive temperature build-up of the test fixture.

Power supplies used shall have a time constant of 2 ms or less. The supply voltage shall not exceed 32 V d.c.

Table 2 — Operating time ratings

Test current A	Operating time min.	Operating time max.
3,5 I_N	0,08 s	0,5 s
2 I_N	0,25 s	5 s
1,35 I_N	0,75 s	1 800 s
1,1 I_N	100 h	No requirement
NOTE — I_N is the rated current.		

5.8 Current test

Apply a current equivalent in value to the rating of the fuse-link on test first for a duration of 5 min. Then increase the current value in steps of 2,5 % of the fuse-link rating each 5 min until the element melts and the current flow is interrupted.

6 Performance requirements

Blade-type fuse-links, when tested in accordance with the test methods specified in clause 5, shall meet the following performance requirements, retaining the principal rated current marking on their fuse-link body.

6.1 Voltage drop

The maximum voltage drop measured at (23 ± 5) °C shall not exceed the values shown in table 3.

Table 3 — Voltage drop

Rated current A	Voltage drop max. mV
1	(under consideration)
2	(under consideration)
3	200
4	
5	
7,5	150
10	140
15	125
20	
25	110
30	

6.2 Current cycling

After cycling for a minimum of 250 000 cycles, the fuse-link shall meet the requirements of the operating time rating test (see 5.7 and 6.6).

6.3 Transient current cycling

After transient current cycling for a minimum of 50 000 cycles, the fuse-links shall meet the requirements of the operating time rating test (see 5.7 and 6.6).

6.4 Vibration

After 6 h of vibration conditioning, the fuse-links shall meet the requirements of the operating time rating test (see 5.7 and 6.6).

When there are additional test requirements, the period of the test shall be agreed between the fuse-link and vehicle manufacturers.