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Road vehicles — Fuse-links —

Part 2:
User's guide

Véhicules routiers — Liaisons fusibles —

Partie 2: Guide de l'utilisateur

[Revision of second edition (ISO 8820-2:2005)]

ICS 43.040.10

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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.

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The main task of technical committees is to prepare International Standards. 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.

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ISO 8820-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

This third edition cancels and replaces the second edition (2005) 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's guide*

— *Part 3: Fuse-links with tabs (blade type) Type C (medium), Type E (high currents) 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) Type SF30 and SF51 and test fixture*

— *Part 6: Single bolt fuse-links*

— *Part 7: Fuse-links with a rated voltage of 450 V (Type G)*

— *Part 8: Fuse-links with bolt-in contacts (Type H and J) with a rated voltage of 450 V*

— *Part 9: Fuse-links miniature low profile (Type K)*

Road vehicles — Fuse-links —

Part 2:
User's guide

1 Scope

This Part of ISO 8820 gives guidance for the choice and application of automotive fuse-links (see Annex A) which are defined in Part 3 and above of this Standard. It describes the various parameters which have to be taken into account when selecting fuse-links.

Fuse-links according to ISO 8820 are intended for electrical cable protection. If these type of fuse-links shall be used for electrical component protection, it shall be agreed between customer and supplier.

It is intended to be used in conjunction with the other parts of ISO 8820.

2 Normative references

The following referenced documents are indispensable for the application 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 - Fuses — 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.

4 Rated voltage and system voltage

The fuse rated voltage shall always be higher than the nominal voltage of the electrical system of the vehicle, to allow for possible overvoltage conditions.

5 Rated current and continuous current

The rated current (I_R) is the current used for identifying the fuse-link.

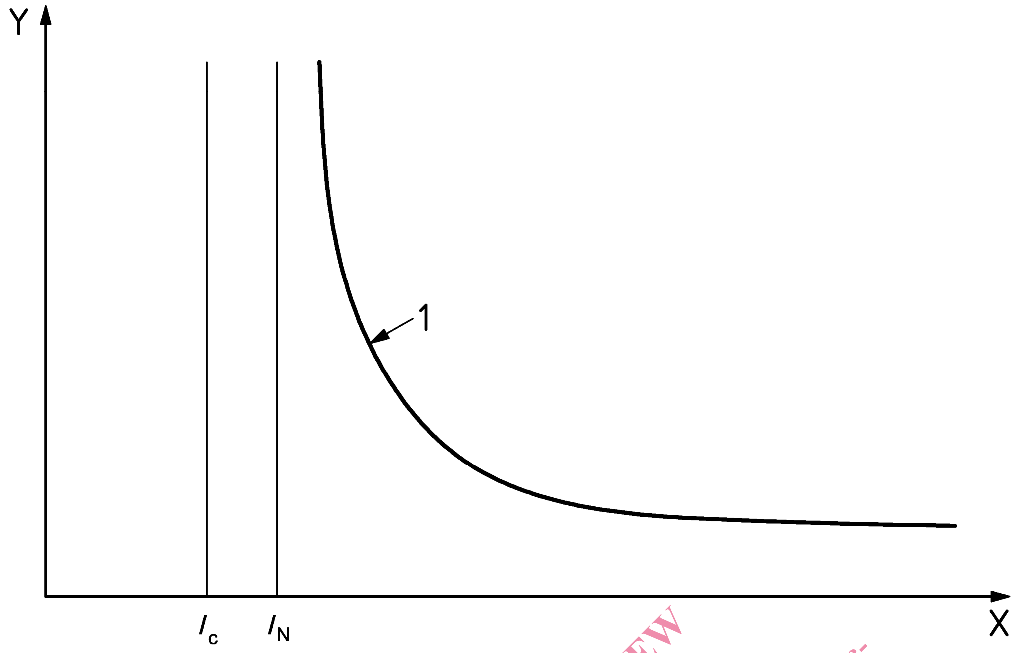
The continuous current (I_C) in Figure 1 is the maximum current flowing continuously through the circuit (fuse-link, terminals, holder and cables) at a maximum ambient temperature. The continuous current is lower than the rated current.

6 Cold resistance

The cold resistance is the resistance of a fuse-link without self-heating at room temperature (RT). It can be calculated by the drop voltage measured, between the measuring points of the fuse-link (specified in the appropriate part of the ISO 8820 according to the type of the fuse) , at a certain current, typically measured at 10% of fuse rated current.

The spread of fuse-link cold resistance due to volume production results in a spread in power dissipation and a spread in time-current characteristic, see Figure 2.

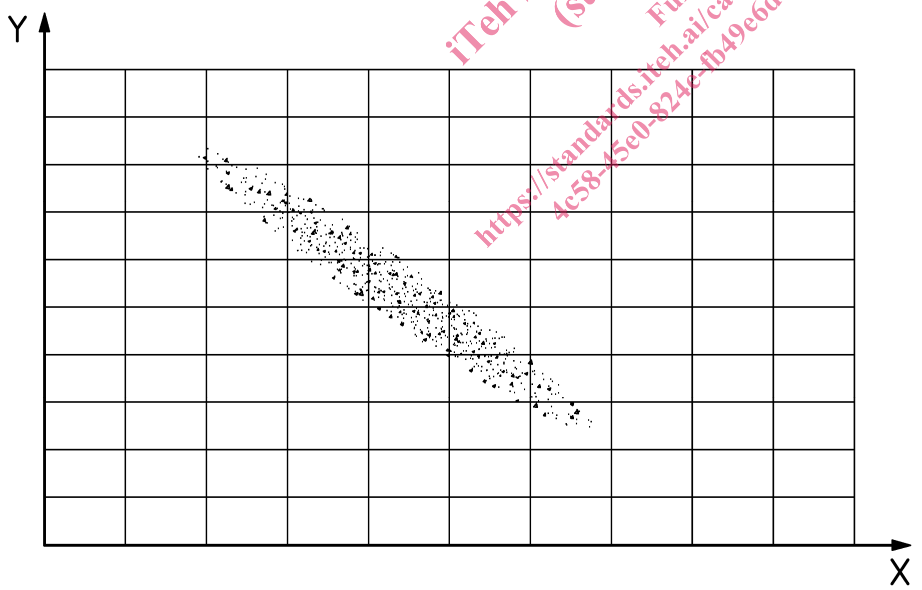
Figures 2 and 3 show the variation of operating time and voltage drop versus cold resistance for a given test current.



Key: Y = Operating time (t)
X = Current (I)
1 = Time-current characteristic

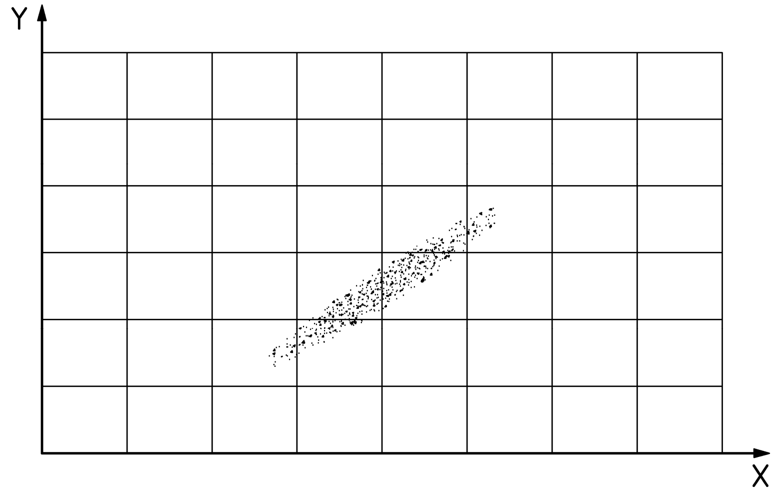
Figure 1 — Rated current, continuous current and time-current characteristic

The rise of the temperature in the circuit depends on current and time.



Key: Y = Operating time
X = Cold resistance

Figure 2 — Cold resistance versus operating time

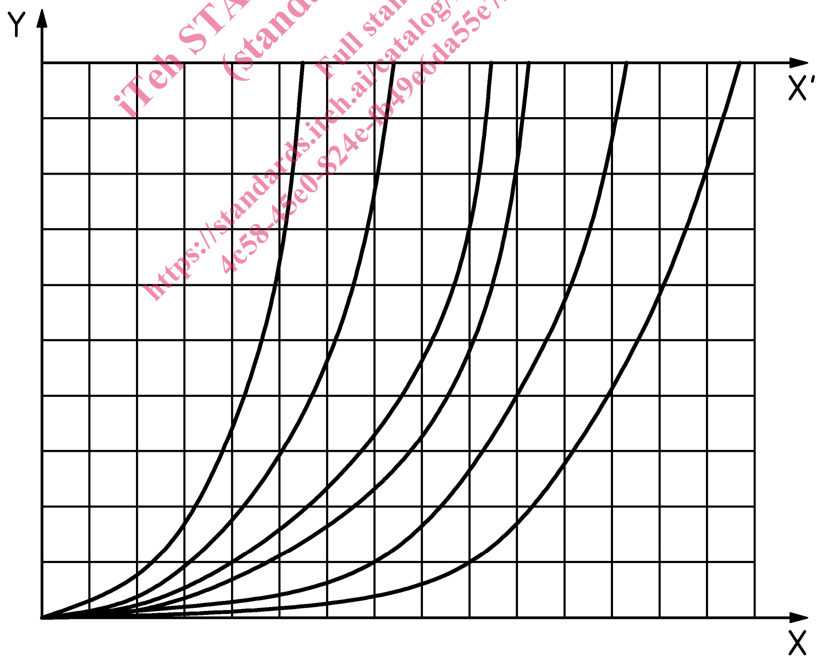


Key: Y = Voltage drop
X = Cold resistance

Figure 3 — Cold resistance versus voltage drop

7 Current and conductors

The temperature rise of a cable is a function of current, conductor cross section and time duration. For system application, other influences e.g. ambient temperature, conducting and isolating material, strands, have to be taken into account, too. Figure 4 shows stabilised temperature rise for various conductor cross sections.



Key: Y = Conductor temperature
X' = Conductor session section
X = Current (I)

Figure 4 — Conductor temperatures for different conductor cross sections versus current

8 Current contact resistance

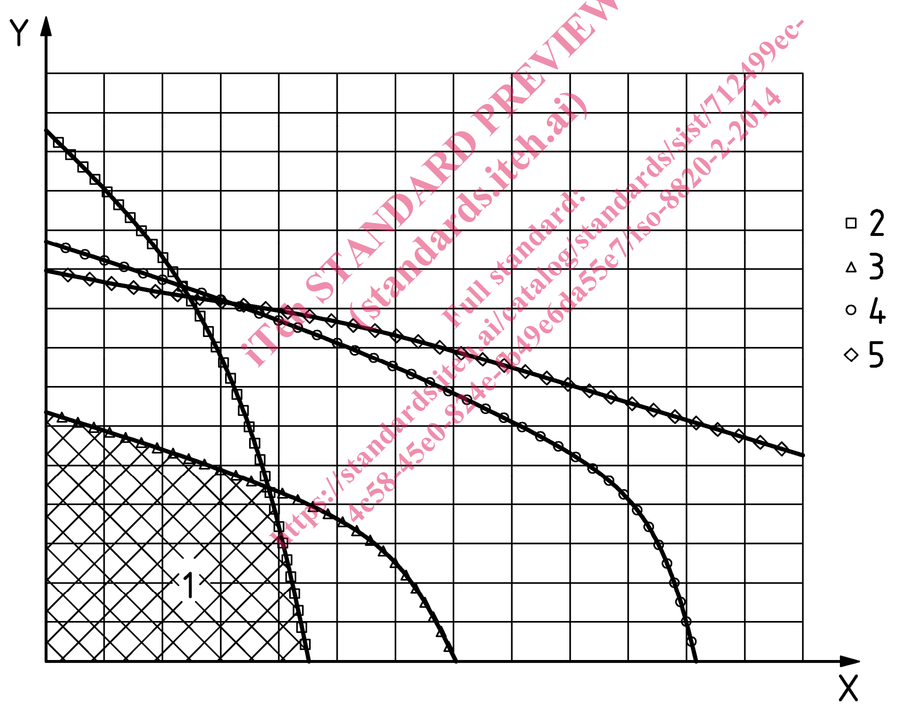
A higher resistance of mated terminals will result in a temperature rise and reduced thermal conduction away from the fuse-link. Hence, the temperature of the fuse-link terminal will be higher and the continuous current for the application lower.

A temperature rise test may be conducted using fuse-links, fuse holders and connections as specified by the vehicle manufacturer. At a specified test current the temperature of the connections shall be measured at the points specified in the appropriate part of the ISO 8820 according to the type of the fuse. After thermal equilibrium has been achieved, the temperature rise of the connection shall not exceed the limits as specified for terminals and cable.

9 Current and ambient temperature

All components of a circuit and their parts have their own characteristic thermal curve as shown in Figure 5.

Each component in a circuit has an upper temperature limit. An increase of temperature beyond this limit can result in increased resistance, which can by itself increase the temperature. As a result, the fuse-link may open.

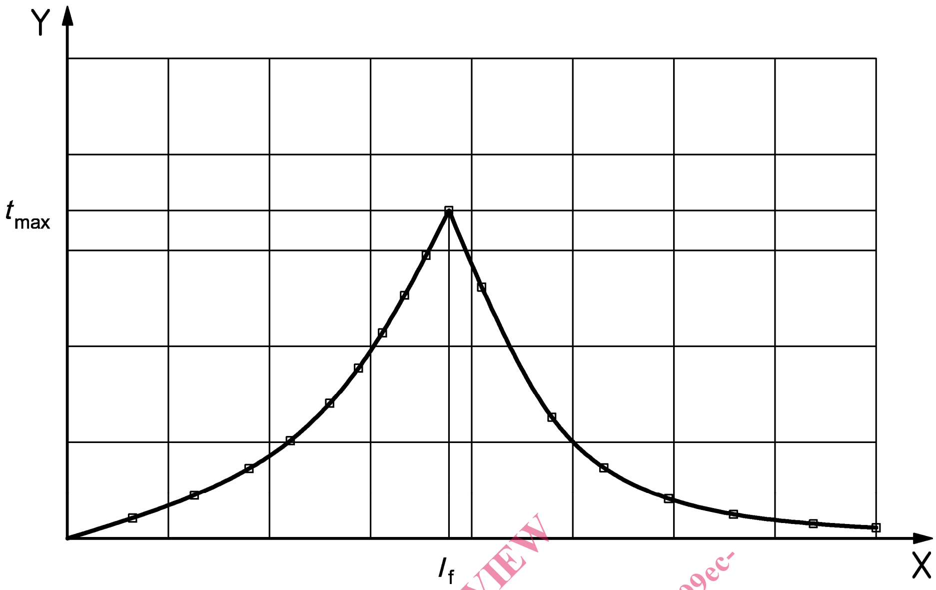


Key: Y = Current
X = Ambient temperature
1 = application area of the system
2 = cable
3 = connection
4 = insulator
5 = fuse element

Figure 5 — Maximum continuous currents of circuit components versus ambient temperature

10 Cable protection versus time-current characteristics

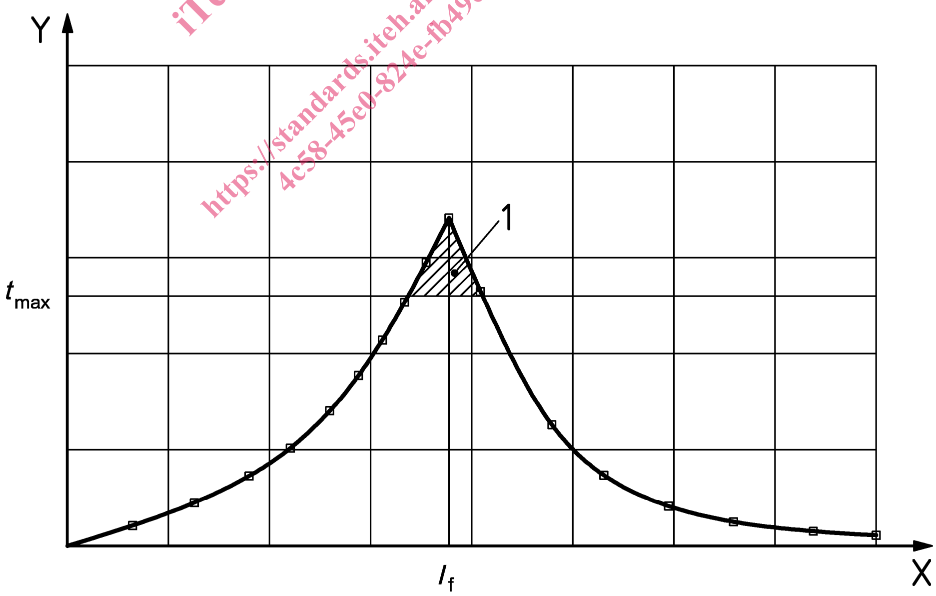
To ensure satisfactory cable protection, fuse-links shall be chosen such that they will always open before the maximum allowed cable temperature T_{max} is exceeded. Figure 6 shows the correct fuse-link selection. The maximum allowed temperature is never exceeded, because above a certain minimal fusing current (I_f), the fuse-link will open the circuit before the maximum permitted temperature of the cable is exceeded.



Key: Y = Cable temperature
X = Current (I)

Figure 6 — Correct fuse selection

Figure 7 shows incorrect fuse selection. The fuse-link allows some potentially damaging current to flow for too long, causing the cable to overheat.



Key: Y = Cable temperature
X = Current (I)
1 = Unprotected region

Figure 7 — Incorrect fuse selection