BS 6885:1988

CONFIRMED
DECEMBER 2007

Specification for

Miniature cartridge fuse links for use on printed wiring boards

UDC 621.316.923.2-181.4:621.3.049.75:620.1

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Power Electrical Engineering Standards Committee (PEL/-) to Technical Committee PEL/78, upon which the following bodies were represented:

Association of Supervisory and Executive Engineers
ERA Technology Ltd.
Electrical Installation Equipment Manufacturers Association (BEAMA Ltd.)
Electrical Power Engineers' Association
Electricity Supply Industry in England and Wales
Engineering Equipment and Materials Users Association
London Regional Transport

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

British Telecommunications plc
Electrical Contractors' Association
Electronic Components Industry Federation
Institution of Electrical Engineers
Ministry of Defence

This British Standard, having been prepared under the direction of the Power Electrical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 August 1988

The following BSI references relate to the work on this standard:
Committee reference PEL/78
Draft for comment 86/27465 DC

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Amendments issued since publication

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Contents

Foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Committee. It covers type tests and requirements for miniature cartridge fuse links for use primarily on printed wiring boards. Other miniature cartridge fuse links are covered in BS 4265 which has, wherever possible, been used as a basis for the present standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

0 Introduction

The automated assembly of electrical and electronic circuits on printed wiring boards has led to a requirement for miniature cartridge fuse-links which have the performance level of existing 5 mm × 20 mm types and are of a form suitable for automatic insertion into printed wiring boards. These new types have dimensions comparable with other passive components and may be provided with axial leads for packaging on reels.

Section 1 of this British Standard covers the general requirements and tests applicable to all types of miniature cartridge fuse-links covered by this British Standard. Section 2 consists of a standard sheet giving the requirements applicable to the type of fuse-link.

1 Scope

This British Standard specifies dimensions and performance characteristics for miniature cartridge fuse-links primarily for use on printed wiring boards, for the protection of electric appliances, electronic equipment and component parts thereof, normally intended for use indoors.

It does not apply to fuses for appliances intended to be used under special conditions, such as in corrosive or explosive atmospheres.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Object

The object of this British Standard is to:

a) establish uniform requirements for cartridge fuse-links for use on printed wiring boards so as to protect appliances or parts of appliances in the most suitable way;

b) define the performance of the fuse-links so as to give guidance to the designers of electric appliances and electronic equipment;

c) define methods of test.

3 Definitions

For the purposes of this British Standard, the definitions given in clause **3** of BS 4265:1977 apply.

4 General requirements

The requirements of clause **4** of BS 4265:1977 shall apply.

5 Standard ratings

The requirements of clause **5** of BS 4265:1977 shall apply.

6 Markings

The requirements of clause **6** of BS 4265:1977 shall apply except that the information given in **6.4** is replaced by the following:

6.4 Colour coding of miniature fuses. Further identification of the current rating and time/current characteristic by means of colour bands may be used.

Such additional marking shall be in accordance with Appendix A of BS 6885.

Table 1 — Testing schedule

Subclause of this standard unless otherwise stated	Description	Fuse-link no.														
		1–6	7 9 11	8 10 13	12 14 15	16 17 18	19 20 21	22 24 26	23 25 27	28 29 30	31 32 33	34 36 38	35 37 39	40 41 42	43 44 45	46 47 48
9.4 of BS 4265:1977	Endurance test	×														
9.2.2 of BS 4265:1977	Test at elevated temperature[a]					×										
9.2.1 of BS 4265:1977	Time/current characteristics:															
	10 I_n		×													
	4 I_n							×								
	2.75 I_n											×				
	2.0 or 2.1 I_n														×	
9.3 of BS 4265:1977	Breaking capacity tests:															
	Rated breaking capacity				×											
	5 times the rated current						×									
	10 times the rated current									×						
	50 times the rated current										×					
	250 times the rated current													×		
8.3	End cap test and wire termination tests:															
	Axial pull		×					×				×			×	
	Bending[b]	×														
8.5 of BS 4265:1977	Soldered joints	×	×			×		×				×			×	
6.2 of BS 4265:1977	Legibility and indelibility of marking		×					×				×			×	

[a] Applicable only when specified on the standard sheets.
[b] Applicable only to fuse-links provided with wire terminations.

7 General notes on tests

NOTE Tests according to this British Standard are type tests.

7.1 Atmospheric conditions for testing

The requirements of **7.1** of BS 4265:1977 shall apply.

7.2 Type tests

NOTE It is recommended, that where acceptance tests are required, they are chosen from the type test in this British Standard.

The requirements of **7.2** of BS 4265:1977 shall apply except that **7.2.2** is replaced by the following:

7.2.2 On the results of Test 5 above, the fuse-links shall be sorted in descending order of voltage drop, and numbered consecutively. Lower numbers being allocated to the fuse-links having the highest voltage drop. Tests from these fuse-links shall then be made in accordance with Table 1 of BS 6885.

If a test is to be repeated, spare fuse-links having approximately the same voltage drop as the original fuse-links shall be used for the repeat test.

7.3 Fuse-bases for tests

For tests, other than breaking capacity tests, that require a fuse-base for mounting the fuse-links, a base according to Figure 1 shall be used. The contact force shall be between 4 N and 6 N. The flexible lead and terminal wires shall be of copper and have a cross-sectional area of 1 mm^2; the length of each of the terminal wires shall be approximately 500 mm.

For breaking capacity tests, a fuse-base according to Figure 2 shall be used. The contact force shall be between 8 N and 12 N. The flexible lead and terminal wires shall be of copper and have a cross-sectional area of 6 mm^2; the length of each of the terminal wires shall be approximately 500 mm.

Both types of base shall have a contact resistance, between each contact and a silvered brass piece having the same nominal dimensions and shape as the fuse-link to be tested, not greater than 3 mΩ measured under the following conditions.

a) In order to prevent the breakdown of thin insulating layers on the contacts, the e.m.f. of the circuit shall not exceed 20 mV (d.c. or a.c. peak).

b) In order to prevent undue heating of the contacts, the current flowing shall not exceed 1 A.

Metal parts of the fuse-base, except the spring and connectors, shall be made of brass. Brass parts of the fuse-base and of the brass piece for measuring contact resistance shall have a copper content between 58 % and 70 %. Contact parts shall be silver plated.

NOTE For fuse-links provided with wire terminations, such terminations should be removed as close to the cap as practicable before performing those tests which require mounting of the fuse-link in a fuse-base.

7.4 Nature of supply

The requirements of **7.4** of BS 4265:1977 shall apply.

8 Dimensions and construction

8.1 Dimensions

The requirements of **8.1** of BS 4265:1977 shall apply.

8.2 Construction

The fuse-element shall be completely enclosed in the cartridge. Fuse-links shall have at each end a metallic cap of cylindrical form. Compliance is checked by inspection.

8.3 End caps and axial wire terminations

The end caps, and also integral wire terminations or separate cap/wire terminations where fitted, shall be of non-corroding metal suitably protected against corrosion, and shall be effectively free from flux or other non-conducting substance on their outer surfaces.

NOTE Nickel or silver plating is deemed to be adequate protection for brass end caps.

Wire terminations, where fitted, shall comply with BS 2011-2.1T regarding solderability.

The outer faces of the caps shall be substantially flat and perpendicular to the axis of the fuse-link.

The caps shall be firmly attached so that it is not possible to remove them without damaging the fuse-link. Compliance is checked by inspection and by the following test.

The samples are immersed in water for 24 h at a temperature between 15 °C and 35 °C. After removal from the water the samples are tested according to their terminal configuration as follows.

a) If the fuse-link is not provided with wire terminations, an axial pull steadily increasing to 5 N is applied to each cap for 1 min. A suitable test apparatus for this purpose is given in Figure 7 of BS 4265:1977, and shall be used in cases of dispute. By using this apparatus, the test can be performed without distorting the end caps.

b) For fuse-links provided with wire terminations, an axial pull steadily increasing to 5 N shall be applied through the terminations for 1 min.

In either case, the caps shall remain firmly attached.

In addition to the above axial pull test, fuse-links with wire terminations shall be subjected to a bending test in accordance with test Ub, method 1 of BS 2011-2.1U:1984 on both terminations. The terminations and caps shall remain firmly attached.

8.4 Alignment

The requirements of **8.4** of BS 4265:1977 shall apply.

8.5 Soldered joints

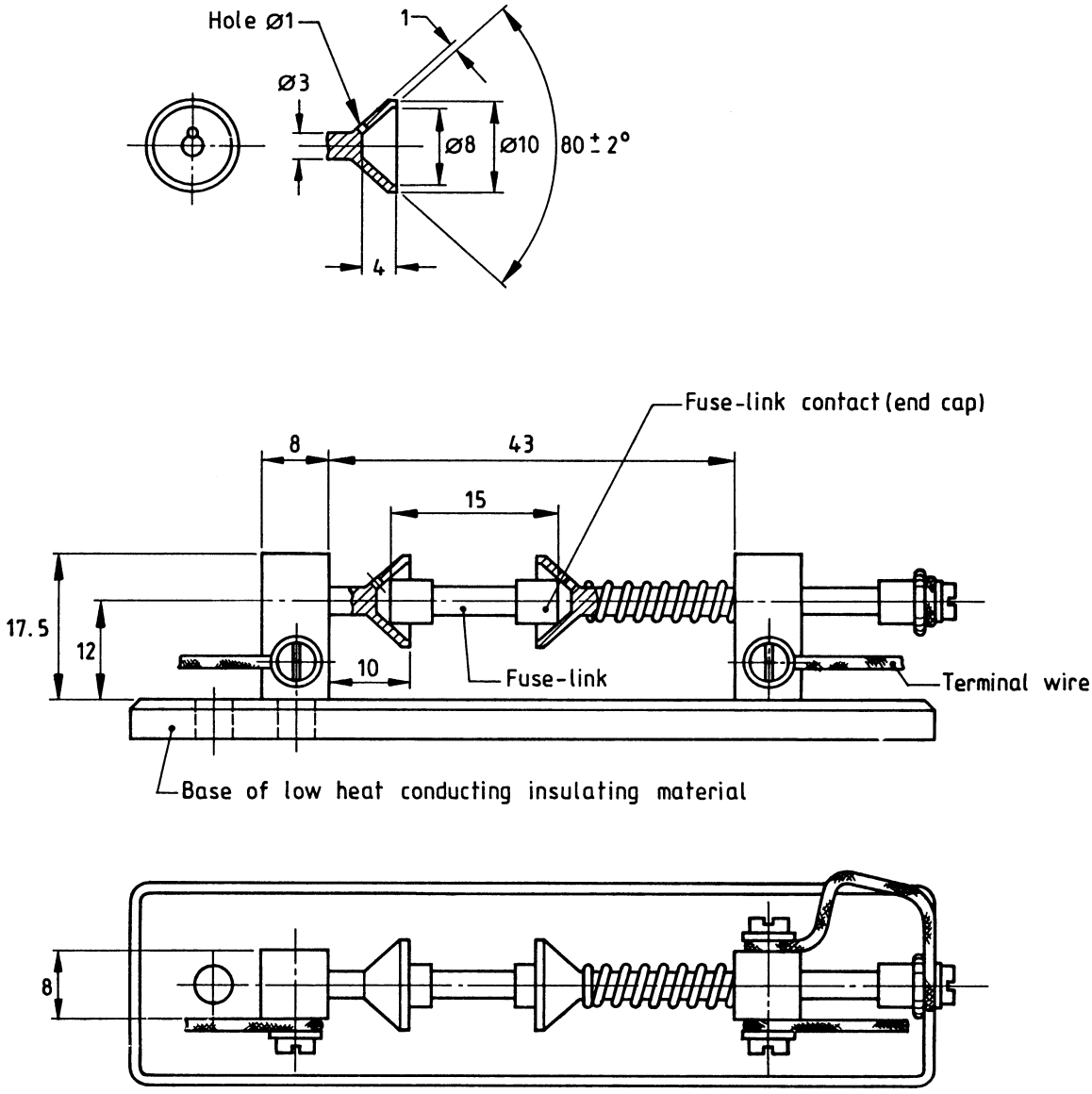
The requirements of **8.5** of BS 4265:1977 shall apply.

8.6 Packaging

Where fuse-links are packaged on continuous tapes for automatic handling, such packaging shall comply with BS 6062-1.

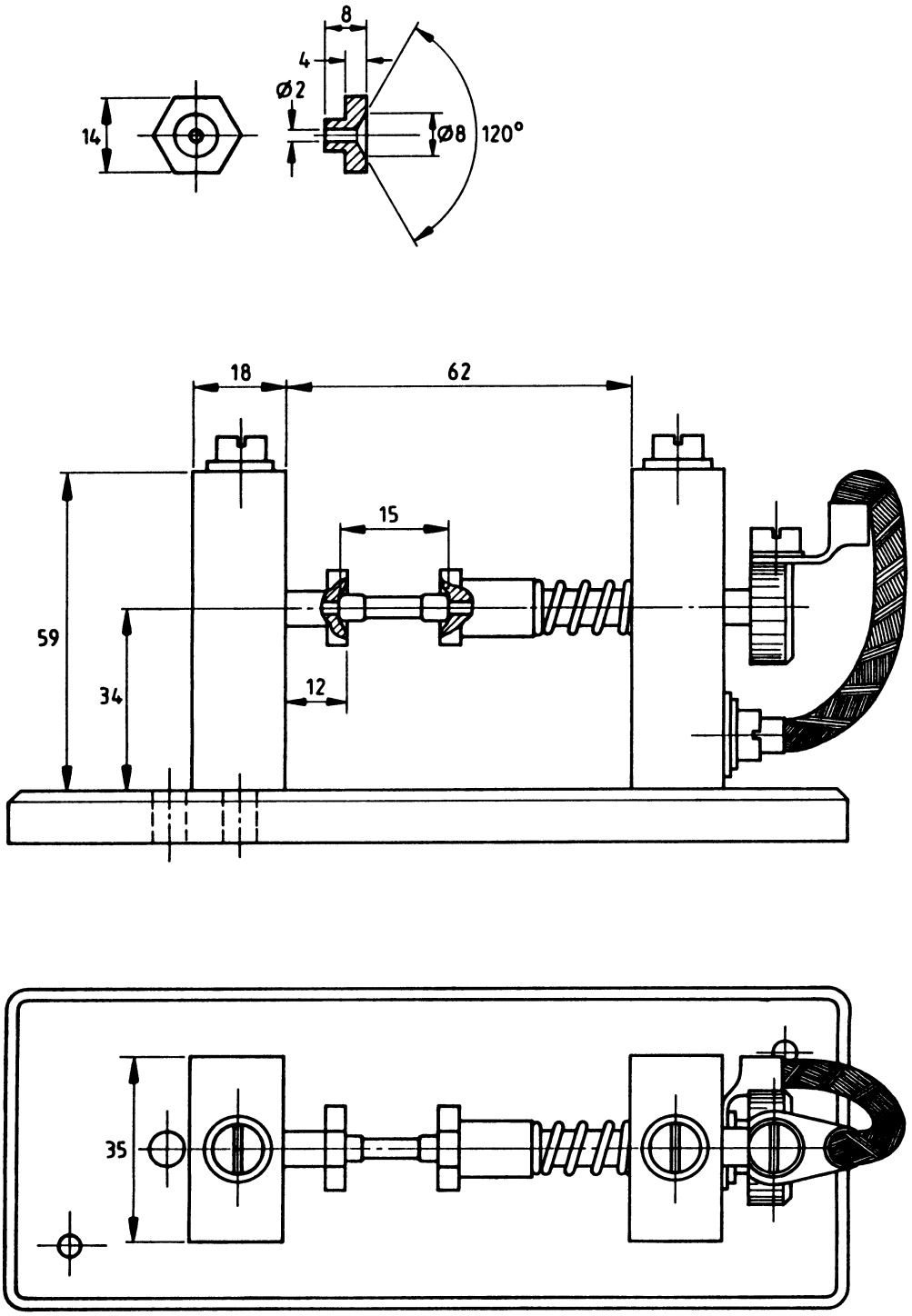
9 Electrical requirements

The electrical requirements of the fuse-links shall comply with clause **9** of BS 4265:1977. The fuse-bases used shall be as specified in **7.3** of this British Standard.



NOTE All linear dimensions are in millimetres with tolerances of 0.1 mm.

Figure 1 — Test fuse-base (see **7.3**)



NOTE All linear dimensions are in millimetres with tolerances of 0.1 mm.

Figure 2 — Test fuse-base for breaking capacity tests (see **7.3**)

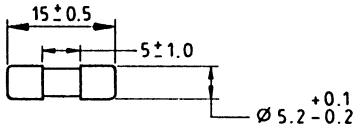
Section 2. Standard sheet

	Fuse-links 5 mm × 15 mm, time-lag (surge-proof), low-breaking capacity	Standard sheet I Page 1

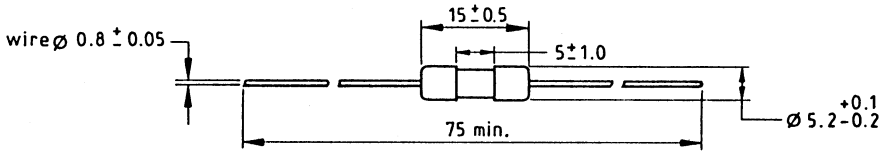
NOTE Care should be taken to ensure that the prospective fault currents of the circuit are within the limits specified in this British Standard.

This type of fuse-link is recommended for the protection of circuits in telecommunication equipment or similar circuits with limited short-circuit current.

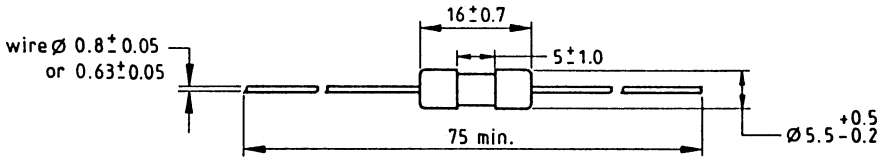
All dimensions are in millimetres.



Type 1 : Fuse-link without wire terminations



Type 2 : Fuse-link with integral wire terminations



Type 3 : Fuse link with separate cap/wire terminations

Alignment: The dimensions of the gauge are:

h = 30 mm; d = 5.38 mm ± 0.01 mm for types 1 and 2.

h = 30 mm; d = 5.68 mm ± 0.01 mm for type 3 (see **8.4** of BS 4265:1977).

Construction: The fuse-link shall be transparent.

Rated current[a]	Rated voltage	Maximum voltage drop
	V	mV
32 mA	250	5 000
40 mA		4 000
50 mA		3 500
63 mA		3 000
80 mA		3 000
100 mA		2 500
125 mA		2 000
160 mA		1 900
200 mA		1 500
250 mA		1 300
315 mA		1 100
400 mA		1 000
500 mA		900
630 mA		300
800 mA		250
1 A		150
1.25 A		150
1.6 A		150
2 A		150
2.5 A		120
3.15 A		100
4 A		100
5 A		100
6.3 A		100

[a] Intermediate values shall be chosen from the R 20 series according to BS 2045.

blank

	Fuse-links 5 mm × 15 mm, time-lag (surge-proof), low-breaking capacity	**Standard sheet I Page 2**

Marking

Fuse-links shall be marked with:

a) rated current;

b) rated voltage;

c) maker's name or trade mark;

d) characteristic symbol T.

Pre-arcing time/current characteristic

The pre-arcing time shall be within the following limits:

Rated current	**2.1 I_n**	**2.75 I_n**		**4 I_n**		**10 I_n**	
	Max.	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**
	min	ms	s	ms	s	ms	ms
32 mA to 100 mA inclusive	2	200	10	40	3	10	300
Above 100 mA to 6.3 A	2	600	10	150	3	20	300

Test at a temperature of 70 ± 2 °C

A current of 1.1 I_n shall be passed through the fuse-links for 1 h and they shall not operate.

Breaking capacity

Rated breaking capacity: 35 A or 10 I_n whichever is greater, tested with a.c. and using the circuit given in Figure 6 of BS 4265:1977, for the low-breaking capacity test.

Endurance test

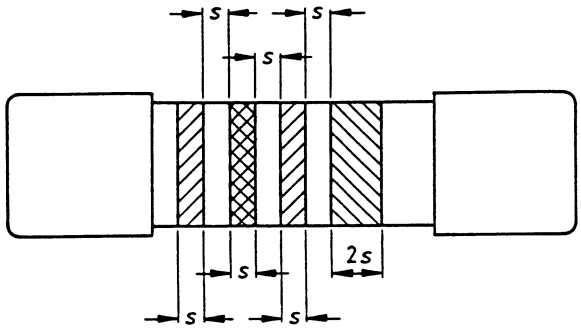
100 cycles at 1.2 times the rated current according to **9.4** b) of BS 4265:1977 followed by 1 h at 1.5 times the rated current according to **9.4** c) of BS 4265:1977.

Appendix A Colour coding for cartridge fuse-links for use on printed wiring boards

The requirements of Appendix A of BS 4265:1977 shall apply except that the information given in **A.2** is replaced by the following:

A.2 The colour bands shall extend at least over half the circumference of the fuse body and shall be evenly spaced and clearly separated as indicated in Figure 3.

NOTE In the case of transparent miniature fuses, the spacings still allow for the visibility of the fuse element.



For miniature fuse-links with dimensions 5 mm × 15 mm in accordance with Standard Sheet I:

$s = 0.3\ ^{+0.2}_{-0}$

Figure 3 — Dimensions of colour code bands

Publications referred to

BS 2011, *Basic environmental testing procedures.*
BS 2011-2.1T, *Test T. Soldering.*
BS 2011-2.1U, *Test U. Robustness of terminations and integral mounting devices.*
BS 2045, *Preferred numbers.*
BS 4265, *Specification for cartridge fuse links for miniature fuses.*
BS 6062, *Packaging of electronic components for automatic handling.*
BS 6062-1, *Specification for tape packaging of components with axial leads on continuous tapes.*

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