

Electric cables — Guide to use for cables with a rated voltage not exceeding 450/750 V —

Part 3: National standard cables not included in HD 21 and HD 22

ICS 29.060.20

Confirmed January 2012

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee GEL/20, Electric cables, to Subcommittee GEL/20/17, Low voltage cables, upon which the following bodies were represented:

- BEAMA Installation Ltd.
- British Approvals Service for Cables
- British Cables Association
- British Plastics Federation
- Chartered Institution of Building Services
- Department of Trade and Industry — Consumer Safety Unit
- Electricity Association
- Energy Industries Council
- Engineering Industries Association
- ERA Technology Ltd.
- Ministry of Defence — UK Defence Standardization

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 22 July 2005

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First published as BS 7540
January 1992
Second edition November 1994
Third edition as BS 7540-3
22 July 2005

The following BSI references relate to the work on this British Standard:
Committee reference GEL/20/17
Draft for comment DC 03/303439

Amendments issued since publication

Amd. No	Date	Comments

ISBN 0 580 45502 3

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Foreword

This part of BS 7540 has been prepared by Subcommittee GEL/20/17. Together with BS 7540-1 and BS 7540-2 it supersedes BS 7540:1994, which is withdrawn.

BS 7540 is published in three parts:

- a) Part 1: *General guidance*;
- b) Part 2: *Harmonized cable types from HD 21 and HD 22*;
- c) Part 3: *National standard cables not included in HD 21 or HD 22*.

BS 7540-1 and BS 7540-2 together form the UK implementation of the European Committee for Electrotechnical Standardization (CENELEC) Harmonization Document HD 516 S2.

NOTE BS 7540 is applicable only to cable types that are specified in British Standards, so the parts of HD 516 that cover non-BS cables are not included in the main body of BS 7540. These non-BS cables are, however, listed in BS 7540-2:2005, Annex A, with references to the relevant clauses in HD 21 and HD 22.

This part of BS 7540 should be read in conjunction with BS 7540-1, which gives general recommendations and guidance.

Attention is drawn to the Electrical Equipment (Safety) Regulations 1994 [1].

Additional information on installation practice is given in BS 7671.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

Summary of pages

This document consists of a front cover, an inside front cover, pages i and ii, pages 1 to 21 and a back cover.

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Introduction

This British Standard provides guidance for equipment manufacturers, installers and end-users on the properties of low voltage electric cables, and the limitations that are deemed to be necessary in order to safeguard life, buildings and goods.

The information is given in the form of limiting values and is illustrated by examples, which are not exhaustive but which indicate ways by which safety can be obtained.

1 Scope

This part of BS 7540 provides guidance for the safe use of electric cables with a rated voltage not exceeding 450/750 V. It is applicable to those cable types specific to the United Kingdom that are specified in BS 638-4, BS 6004, BS 6007, BS 6500, BS 7211 and BS 7919.

NOTE These British Standards also specify requirements for cable types specified in Harmonized Documents HD 21 and HD 22. Guidance on these cables is given in BS 7540-2. The classes of external influence (environmental conditions) used in this part of BS 7540 are as listed in BS 7540-1:2005, Annex B.

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.

BS 638-4:1996, *Arc welding power sources, equipment and accessories — Specification for welding cables*.

BS 4727-2:Group 08, *Glossary of Electrotechnical, power, telecommunication, electronics, lighting and colour terms — Part 2: Terms particular to power engineering — Group 08: Electric cable terminology*.

BS 6004:2000, *Electric cables — PVC insulated, non-armoured cables for voltages up to and including 450/750 V, for electric power, lighting and internal wiring*.

BS 6007:2000, *Electric cables — Single core unsheathed heat resisting cables for voltages up to and including 450/750 V, for internal wiring*.

BS 6500:2000, *Electric cables — Flexible cords rated up to 300/500 V, for use with appliances and equipment intended for domestic, office and similar environments*.

BS 7211:1998, *Specification for thermosetting insulated cables (non-armoured) for electric power and lighting with low emission of smoke and corrosive gases when affected by fire*.

BS 7540-1:2005, *Electric cables — Guide to use for cables with a rated voltage not exceeding 450/750 V — Part 1: General guidance*.

BS 7671, *Requirements for electrical installations — IEE Wiring Regulations — Sixteenth edition*.

BS 7919:2001, *Electric cables — Flexible cables rated up to 450/750 V, for use with appliances and equipment intended for industrial and similar environments*.

3 Terms and definitions

For the purposes of this part of BS 7540, the terms and definitions given in BS 7540-1, BS 7671 and BS 4727-2:Group 08 apply.

4 Specific cable types

Specific guidance for each cable type is organised in tabular format.

- BS 638-4 is covered by Table 1;
- BS 6004 is covered by Table 2;
- BS 6007 is covered by Table 3;
- BS 6500 is covered by Tables 4 and 5;
- BS 7211 is covered by Table 6;
- BS 7919 is covered by Table 7.

There are two tables for each British Standard.

Table A for the relevant British Standard shows:

- where to find the specific cable type in the British Standard;
- applicable national codes;
- constructional details for the cable;
- recommendations for installation (fixed cable types) or conditions and limits of operation (flexible cords and cables);
- recommended temperature limits.

Table B shows, for each generic cable type in the relevant British Standard:

- recommended use;
- comments about limitations and suitability.

NOTE Annex A shows how the table numbers in the cable product standards correspond to the table numbers in this part of BS 7540.

Table 1A — Arc welding cables conforming to BS 638-4 — Constructional details, method of installation and temperature

Parameter	Unit	Constructional details, method of installation and temperature					
		BS 638-4:1996, Table 1	BS 638-4:1996, Table 2	BS 638-4:1996, Table 3	BS 638-4:1996, Table 3	BS 638-4:1996, Table 6	BS 638-4:1996, Table 7
Constructional details	V	100/100 Copper D	100/100 Copper E	100/100 Aluminium A	100/100 Aluminium A	450/450 Copper D	450/450 Aluminium A
Nominal voltage rating		RS5	RS5	EM5	RS5	EM5 or RS3	EM5 or RS3
Conductor material		1	1	1	1	1	1
Conductor class ^a		10 to 185	10 to 185	25 to 240	25 to 240	10 to 185	25 to 240
Outer covering material compound code							
Number of cores							
Cross-sectional area size range	mm ²						
Duty^b							
Extra light		+	+	+	+	+	+
Light		+	+	+	+	+	+
Ordinary		+	+	+	+	+	+
Heavy		+	+	+	+	+	+
Presence of water							
Condition AD1		+	+	+	+	+	+
Condition AD2		+	+	+	+	+	+
Condition AD6		—	—	—	—	—	—
Condition AD7		—	—	—	—	—	—
Condition AD8		—	—	—	—	—	—
Corrosive or polluting substances condition AF3		—	—	+	—	+	+
Impact condition AG2		+	+	+	+	+	+
Vibrations condition AH3		+	+	+	+	+	+
Flora condition AK2		—	—	—	—	—	—
Fauna condition AL2		—	—	—	—	—	—
Solar radiation condition AN2		—	—	—	—	—	—
Outdoor use^c							
Intermittent and temporary periods of short duration ^d		+	+	+	+	+	+
Permanent ^d		+	+	—	—	+	—

Table 1A — Arc welding cables conforming to BS 638-4 — Constructional details, method of installation and temperature (continued)

Parameter	Unit	Constructional details, method of installation and temperature					
		BS 638-4:1996, Table 1	BS 638-4:1996, Table 2	BS 638-4:1996, Table 3	BS 638-4:1996, Table 3	BS 638-4:1996, Table 6	BS 638-4:1996, Table 7
Flexing and torsion							
Frequent flexing		+	+	+	+	+	+
Frequent torsion		+	+	+	+	+	+
Temperature							
Maximum continuous conductor operating	°C	85	85	85	85	85	85
Maximum conductor short circuit ^{e, f}	°C	250	250	250	250	250	250
Maximum cable surface ^g	°C	80	80	80	80	80	80
Maximum storage ^h	°C	40	40	40	40	40	40
Minimum installation and handling	°C	-40	-40	-20	-40	-20	-20
“+” = Acceptable “—” = Not suitable							
^a Conductor class designations: A = aluminium welding; D = normal flexible welding; E = extra flexible welding. ^b See BS 7540-1:2005, Annex D. ^c Only relevant classification given for duty. ^d See BS 7540-1:2005, Annex C. ^e Maximum allowable time 5 s. ^f Values in excess of 160 °C are reduced under certain conditions (see BS 7540-1:2005, 5.3.4). ^g See BS 7540-1:2005, 5.4.3. ^h In direct sunlight the storage temperature of the cable may exceed the value given but subject to a maximum of 60 °C.							

Table 1B — Arc welding cables conforming to BS 638-4 — Guide to use

Cable type	Standard reference BS 638-4:1996	Recommendations for use	Comments
Cables with flexible copper conductor and elastomeric covering	Tables 1, 2 and 6	The cables are suitable for: — use with hand-held electrodes at 100 V.	Cables conforming to BS 638-4:1996, Table 6 may also be used for voltages not exceeding 450 V if adequately protected from damage. Duty cycles, current ratings and voltage drop should conform to BS 7540-2:2005, Annex B.
Cables with flexible aluminium conductor and elastomeric covering	Tables 3 and 7	The cables are suitable for: — use as an extension cable to be connected to the flexible copper welding cable at 100 V. The cables are not suitable for: — direct connection to hand-held electrodes at 100 V.	Cables conforming to BS 638-4:1996, Table 7 may also be used for voltages not exceeding 450 V if adequately protected from damage. Duty cycles, current ratings and voltage drop should conform to Annex B.