BS EN 50525-1:2011

BSI Standards Publication

Electric cables — Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U)

Part 1: General requirements

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 50525-1:2011.

In the UK, the BS EN 50525 series of standards contain complex supersession details. The table below best summarizes the relationship between these standards:

Part 1 together with	Supersedes
2-81	BS 638-4:1996
2-41, 2-42	BS 6007: 2006
2-11 (in part), 2-12, 2-21 (in part), 2-71	BS 6500:2000
2-11 (in part), 2-21 (in part), 2-51 (in part), 2-83, 3-21	BS 7919:2001
2-31, 2-51 (in part)	**BS 6004:2000**
3-41	**BS 7211:1998**
2-22, 2-72, 2-82, 3-11, 3-31	None

NOTE All British Standards will remain current until they are withdrawn on 31 December 2012. British Standards in bold are only partially superseded, and new editions of BS 6004 and BS 7211 will be introduced on 1 January 2013.

National Annexes NA and NB (informative) give information on, respectively, the structure of the whole of the BS EN 50525 series and its derivation from British Standards and from HD 21 and HD 22 (Annex NA), and Standard United Kingdom reference codes (Annex NB).

The UK participation in its preparation was entrusted to Technical Committee GEL/20/17, Electric Cables - Low voltage.

A list of organizations represented on this committee can be obtained on request to its secretary.

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

© BSI 2011

ISBN 978 0 580 64360 6

ICS 29.060.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2011.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50525-1

May 2011

ICS 29.060.20

Supersedes HD 21.1 S4:2002, HD 22.1 S4:2002

English version

Electric cables - Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) - Part 1: General requirements

Câbles électriques - Câbles d'énergie basse tension de tension assignée au plus égale à 450/750 V (U_0/U) - Partie 1: Exigences générales

Kabel und Leitungen - Starkstromleitungen mit Nennspannungen bis 450/750 V (U_0/U) - Teil 1: Allgemeine Anforderungen

This European Standard was approved by CENELEC on 2011-01-17. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

© 2011 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC members.

Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 20, Electric cables.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50525-1 on 2011-01-17.

This document, which is one of a multipart series, supersedes HD 21.1 S4:2002 and HD 22.1 S4:2002.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2012-01-17
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-01-17

_____

Contents

Tables

Introduction

EN 50525 derives from CENELEC Harmonization Documents HD 21 and HD 22. It has the following parts:

- Part 1: General requirements;

- Part 2: Cables for general applications;

- Part 3: Cables with special fire performance.

Parts 2 and 3 are further subdivided for the particular cables and applications.

NOTE Annex E gives a full description of the structure of EN 50525, its content and its derivation from HD 21 and HD 22.

An intention of the conversion work, which forms part of an overall CENELEC initiative to convert remaining HDs to ENs, is to create a structure for the EN that will be sufficiently robust to ensure a simple means of making future additions or amendments.

As part of the work there has been a review of the market relevance of cable types in HD 21 and HD 22, and changes have been made accordingly.

Some matters previously in HD 21 and HD 22 are now in separate publications thus:

- Insulating, sheathing and covering materials – EN 50363 series;

- Electrical test methods – EN 50395;

- Non-electrical test methods – EN 50396.

The collective object of all parts of EN 50525 is:

- to standardise cables that are safe and reliable when properly selected, installed and used;

- to state the characteristics and manufacturing requirements directly or indirectly bearing on safety; and

- to specify methods for checking conformity with those requirements.

European and national regulations contain requirements and recommendations relating to the environment. CENELEC TC 20 has published a Technical Report (TR) that offers guidance and assistance to standard-writers of TC 20, to take into account the relevant environmental aspects as far as they are specific to electric cables in normal use. The TR is CLC/TR 62125, *Environmental statement specific to TC 20 - Electric cables*

This EN takes account, where appropriate and practicable, of the guidance in CLC/TR 62125.

Cables within EN 50525 satisfy the essential health and safety requirements of the Low Voltage Directive (2006/95/EC).

1 Scope

This European Standard gives the general requirements for rigid and flexible energy cables of rated voltages U_0/U up to and including 450/750 V a.c., used in power installations and with domestic and industrial appliances and equipment.

NOTE 1 For some types of flexible cables, the term "cord" is used.

NOTE 2 Rated voltages are given by reference to alternating current (a.c.) systems. Use of the cables in direct current (d.c.) systems is permitted.

NOTE 3 National regulations may prescribe additional performance requirements for cables that are not given in the particular requirements. For example for buildings with high levels of public access, additional fire performance requirements may be applicable,

The test methods for checking conformity with the requirements are given in other standards (see Introduction).

The particular types of cables are specified in EN 50525-2 (series) and EN 50525-3 (series). The individual parts within those two series are collectively referred to hereafter as "the particular specifications".

Only the sizes (conductor class, cross-sectional area), number of cores, other constructional features and rated voltages given in the particular specification apply to the individual cable type.

The code designations of these types of cables are in accordance with HD 361.

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.

NOTE One or more references to the standards below are in respect of a specific sub-division of that standard, for instance a clause, a table, a class or a type. Cross-references to these standards are undated and, at all times, the latest version applies.

EN 50267-2-1		Common test methods for cables under fire conditions – Tests on gases evolved during combustion of materials from cables – Part 2-1: Procedures – Determination of the amount of halogen acid gas
EN 50267-2-2		Common test methods for cables under fire conditions – Tests on gases evolved during combustion of materials from cables – Part 2-2: Procedures – Determination of degree of acidity of gases for materials by measuring pH and conductivity
EN 50334		Marking by inscription for the identification of cores of electric cables
EN 50363	Series	Insulating, sheathing and covering materials for low-voltage energy cables
EN 50395		Electrical test methods for low voltage energy cables
EN 50396		Non electrical test methods for low voltage energy cables
EN 60228		Conductors of insulated cables (IEC 60228)
EN 60684-2		Flexible insulating sleeving – Part 2: Methods of test (IEC 60684-2)

HD 308	Identification of cores in cables and flexible cords
HD 361	System for cable designation
HD 516	Guide to use of low voltage harmonized cables

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
type tests (Symbol T)
tests required to be made before supplying a type of cable covered by this standard on a general commercial basis, in order to demonstrate satisfactory performance characteristics to meet the intended application

NOTE These tests are of such a nature that, after they have been made, they need not be repeated unless changes are made in the cable materials, design or type of manufacturing process which might change the performance characteristics.

3.2
sample tests (Symbol S)
tests made on samples of completed cable, or components taken from a completed cable adequate to verify that the finished product meets the design specifications

3.3
routine tests (Symbol R)
tests made on all production cable lengths to demonstrate their integrity

3.4
dummy core
extruded element having the same overall diameter as the insulated core

4 Rated voltage

The rated voltage of a cable is the reference voltage for which the cable is designed.

The rated voltage in an alternating current system, is expressed by the combination of two values U_0/U, expressed in volts, where:

a) U_0 is the r.m.s. value between any insulated conductor and “earth” (metal covering of the cable or the surrounding medium);

b) U is the r.m.s. value between any two phase conductors of a multicore cable or of a system of single core cables.

In an alternating current system, the rated voltage of a cable should be at least equal to the nominal voltage of the system for which it is intended. This condition applies to the values of both U_0 and U.

NOTE For information about the maximum permanent permitted operating voltage of the system (a.c. or d.c.) refer to HD 516.

5 Requirements for the construction of cables

5.1 General

The requirements given in this Part 1 shall apply to all cables in EN 50525, except where otherwise specified in the particular specification.

NOTE The particular specification may deviate from the general requirements, either by addition, subtraction or amendment.

5.2 Conductors

5.2.1 Material

The conductors shall be copper, and in accordance with EN 60228.

The wires of conductors may be plain or metal coated, for example with tin or silver. Coated wires shall be covered with a continuous layer of the coating.

There shall be no visible gaps in the continuous layer, when examined with normal or corrected vision.

5.2.2 Construction

The maximum diameters of the wires of flexible conductors and the minimum number of the wires of rigid conductors shall be in accordance with EN 60228.

The classes of the conductors relevant to the various types of cables are given in the particular specifications.

5.2.3 Separator between conductor and insulation

Unless otherwise specified in the particular specification it is permitted to place a separator tape between the conductor and the insulation.

5.2.4 Check of construction

Compliance with the requirements of 5.2.1, 5.2.2 and 5.2.3, including the requirements of EN 60228, shall be checked by inspection and by measurement.

5.2.5 Electrical resistance

The resistance of each conductor at 20 °C shall be in accordance with the requirements of EN 60228 for the given class of the conductor.

Compliance shall be checked by the test given in Clause 5 of EN 50395.

5.3 Insulation

5.3.1 Material

The insulation material shall be specified in the particular specification, and shall be selected from those given in EN 50363.

The requirements for the insulation are specified in the relevant part of EN 50363, which also gives the maximum continuous conductor operating temperatures for each insulation compound.

NOTE The maximum operating and short-circuit temperatures for a particular cable may be lower than that for the specific insulation compound. See HD 516 for further guidance.

5.3.2 Application to the conductor

The insulation shall be applied by extrusion, such that it fits closely on the conductor, but does not adhere to it. It shall be possible to remove it without damage to the insulation itself, to the conductor or to the metal coating if any. It is permitted to apply the insulation in a single layer, or in a number of coherent layers. Where more than one layer is used, all testing shall be carried out on the complete insulation as though it were a single layer.

NOTE Insulation applied in more than one layer does not conform to the definition of “Double insulation” given, for instance, in HD 60364.

Compliance shall be checked by inspection and by manual test.

5.3.3 Thickness

The mean value of the thickness of insulation shall be not less than the specified value for each type and size of cable shown in the tables of the particular specifications.

However, the thickness at any place may be less than the specified value provided that the difference does not exceed 0,1 mm + 10 % of the specified value.

Compliance shall be checked by the test given in 4.1 of EN 50396.

5.4 Core identification

5.4.1 General

Identification of the cores of a cable shall be achieved by the use of coloured insulation or by a coloured surface.

The colours shall be clearly identifiable and durable. Durability shall be checked by the test given in 5.1 of EN 50396.

NOTE 1 It is not a requirement of the standard that colours should be an exact match against a particular scheme or chart. If there is a case of doubt about the identification of a particular colour, reference should be made to HD 402.

NOTE 2 Cores identified by the colour blue, and those identified by the bi-colour green-and-yellow, have specific functionality that is described in EN 60445. The application of cables with these colours is specified in HD 60364 and the equivalent national standards implementing the HD.

5.4.2 Single core cables – Non-sheathed cables

The core colours shall be chosen from the following:

a) For cable types rated 300/500 V (H05 types) the following mono-colours are recognised: black, blue, brown, grey, orange, pink, red, turquoise, violet, white, green and yellow. Bi-colours of any combination of the above mono-colours are permitted. The distribution of the colours for the core bi-coloured green-and-yellow shall comply with 5.4.4.

b) For cable types rated 450/750 V (H07 types) the following mono-colours are recognised: black, blue, brown, grey, orange, pink, red, turquoise, violet and white. Bi-colours shall not be used except the combination of the mono-colours green-and-yellow, the distribution of the colours of which shall comply with 5.4.4.

5.4.3 Multicore sheathed cables

5.4.3.1 Identification by colour

Each core of a multicore cable shall have only one colour, except the core identified by a combination of the colours green-and-yellow. In multicore cables, the colours green and yellow shall not be used separately as single colours.

For multicore cables with two to five cores, the core colours, and their rotational position in the cable, shall be in accordance with HD 308.

5.4.3.2 Identification by numbering

Where the particular specification permits identification of the cores of multicore cables by numbering, it shall conform to EN 50334.

5.4.3.3 Cables with more than five cores

Multicore cables with more than five cores shall be identified in accordance with Annex D.

5.4.4 Colour combination green-and-yellow

The combination of the colours green-and-yellow shall be such that, on any 15 mm length of the core, one of these colours covers at least 30 % and not more than 70 % of the surface of the core, the other colour covering the remainder of that surface.

NOTE This requirement is in accordance with EN 60445.

Compliance shall be checked using one of the test methods in 5.2 of EN 50396.

5.5 Assembly of cores

For flat cables the cores shall be laid parallel.

The cores of circular cables shall be twisted together.

Additional requirements for assembly may be given in the particular specification.

5.6 Other components

5.6.1 General

Apart from a sheath, any of the following components may be included in the construction of the cables:

a) interstitial fillers;

b) strain-bearing members;

c) inner covering;

d) inner sheath;

e) metallic screen;

f) textile braid covering.

The inclusion of one or more of the above components shall be given in the particular specification. Where a component is specified it shall comply with the appropriate requirements of 5.6.2 to 5.6.7 below.

5.6.2 Interstitial fillers

5.6.2.1 Composition

Fillers shall be composed of one of the following or of any combination of the following:

– a compound based on polymeric materials; or

– natural or synthetic textiles; or

– paper.

A strain bearing member (sbm) may also form part of the internal construction of a cable and, if present, shall conform to 5.6.3.

5.6.2.2 Assembly

The assembly of cores and fillers may be held together by a film or tape.

In multicore cables, a centre filler is permitted.

5.6.2.3 Requirements

Fillers shall fill the spaces between the cores, and shall not adhere to the cores. The fillers shall be capable of being removed without damage to the cores.

NOTE Incorporation of fillers should lead to the finished cable having a practically circular shape (see 5.7.2.1).

There shall be no harmful interactions between the fillers and the insulation and/or the sheath. Compliance shall be checked as part of the compatibility test requirements for the particular cable.

5.6.3 Strain bearing members (sbm)

Where a strain bearing member, or members, is required it shall be incorporated into the cable in accordance with the particular specification. It may be metallic or non-metallic according to the particular specification.

There shall be no harmful interactions between the sbm and the insulation and/or the sheath. This shall be checked as given for fillers in 5.6.2.

5.6.4 Inner covering

Extruded inner coverings shall be composed of a compound based on polymeric materials.

No dimensional measurements shall be required for inner coverings.

There shall be no harmful interactions between inner coverings and the insulation and/or sheath. Compliance shall be checked as part of the compatibility test requirements for the particular cable.

Extruded inner coverings shall surround the cores.

NOTE Incorporation of an inner covering should lead to the finished cable having a practically circular shape (see 5.7.2.1).

An inner covering shall not adhere to the cores, and shall be capable of being removed without damage to the cores. Where indicated in the particular specification the inner covering may penetrate between the cores, thus forming a filling.

5.6.5 Inner sheath

Extruded inner sheaths shall be composed of a compound in accordance with EN 50363.

Requirements for the thickness of inner sheaths shall be as given in the particular specification.

There shall be no harmful interactions between inner sheaths and the insulation and/or sheath. Compliance shall be checked as part of the compatibility test requirements for the particular cable.

Extruded inner sheaths shall surround the cores.

NOTE Incorporation of an inner sheath should lead to the finished cable having a practically circular shape (see 5.7.2.1).

An inner sheath shall not adhere to the cores, and shall be capable of being removed without damage to the cores. Where indicated in the particular specification the inner sheath may penetrate between the cores, thus forming a filling.

5.6.6 Metallic screen

The screen shall be composed of a braid of copper wires. The wires may be plain or metal-coated.

Coated wires shall be covered with a continuous layer of the coating.

There shall be no visible gaps in the continuous layer, when examined with normal or corrected vision.

The screen shall be applied over an inner sheath.

Requirements for the diameter of wires for metallic screens shall be as given in the particular specification.

5.6.7 Textile braid

5.6.7.1 Material

The material for the yarns may be based on natural material (cotton, or treated cotton) or on synthetic material (polyamide, etc.) or else may be filaments made of glass or equivalent material.

5.6.7.2 Application

The braid shall have a uniform texture, without knots or gaps. Braids made from glass filaments shall be prevented from fraying.

NOTE Fraying of glass braids may be prevented by the use of a suitable quality of glass, or by treatment of each filament or the complete braid with a suitable coating.

5.7 Sheath

5.7.1 Material

The sheath material shall be specified in the particular specification, and shall be selected from those given in EN 50363.

The requirements for the sheath are specified in the relevant part of EN 50363, which also gives the maximum cable operating temperatures for each sheath compound.

NOTE Single core arc welding cables to EN 50525-2-81 are rated 100/100 V and have a protective layer referred to as a "covering". For completeness, the relevant material is also listed in EN 50363.

5.7.2 Application

5.7.2.1 General

The sheath shall be applied by extrusion and shall consist of a single layer unless otherwise specified in the particular specifications.

Assemblies of cores shall be surrounded by tapes, or an inner covering, or an inner sheath or by the sheath itself, or by a combination of these according to the particular specification. In all cases there shall be no substantial cavities between the assembled cores and the next immediate layer.

NOTE In some cases, according to the particular specification, interstitial fillers may be allowed and may also fill any such cavities.

Unless otherwise specified in the particular specification, the application of the sheath shall give the finished cable a practically circular shape.

5.7.2.2 Sheath in a single layer

The sheath shall be applied as a homogeneous layer:

a) on the core, for single core cables;

b) on the assembly of cores and other components (see 5.6.1), if any, for multicore cables.

The sheath shall not adhere to the core(s), and shall be capable of being removed without damage to the core(s).

A separator, consisting of a tape, may be applied under the sheath.

In certain cases, indicated in the particular specifications, the sheath may penetrate into the spaces between the cores, thus forming a filling.

When specially requested by a customer and agreed by the manufacturer, the sheath of a single core cable may be required to adhere to the insulation. If the sheath is bonded to the insulation it shall be visibly distinguishable from the insulation.

5.7.2.3 Sheath in two separate homogeneous layers

a) Inner layer

The inner layer of the sheath shall be applied as specified in 5.7.2.2.

The application of a suitable tape between the two layers of sheath is optional.

The thickness of tape, if any, may be included, for a value not exceeding 0,5 mm, in the measurement of the thickness of inner layer provided that it adheres to the latter.

b) Outer layer

The outer layer of the sheath shall be applied over the inner layer or over the tape. It shall be applied as a homogeneous layer.

If the outer layer is bonded to the inner layer, it shall be visibly distinguishable from the inner layer; if it is not bonded, it shall be easily separable from the inner layer.

c) Non-electrical tests on sheath in two layers

Each of the two layers shall be tested separately with test methods and requirements as for each type of compound as given in the relevant part of EN 50363. If the two layers are bonded and a separation with low mechanical deformation and/or without damaging the surface is not possible, test samples of each compound shall be prepared by cutting or grinding, and tested as stated above, care being taken to avoid undue heating.

5.7.3 Thickness

The mean value of the thickness of the sheath shall be not less than the specified value for each type and size of cable shown in the tables of the particular specifications.

However, the thickness at any place may be less than the specified value provided that the difference does not exceed 0,1 mm + 15 % of the specified value, unless otherwise specified.

Compliance shall be checked by the test given in 4.2 or 4.3 of EN 50396.

5.7.4 Colour

5.7.4.1 Application

The colour shall be throughout the whole of the sheath (or the whole of the outer layer in a two layer construction) or on its surface (see 5.7.4.2).

Where surface colouring is applied, the surface colour shall be of essentially the same material as the underlying material and shall be applied as part of the extrusion process. The surface colour shall not be separable from the underlying material and shall be durable. Durability shall be checked by the test given in 5.1 of EN 50396.

5.7.4.2 Outdoor use

Cables that are suitable for permanent outdoor use (see HD 516) shall:

a) either have a black sheath in accordance with the relevant requirement for the specific material in EN 50363;

b) or be suitably protected and tested by the manufacturer against exposure to UV.

Surface colouring shall not be permitted for a).

6 Marking

6.1 Indication of origin

Cables shall be provided with an identification of origin consisting of:

a) either the manufacturer's identification thread;

b) or the continuous marking of the manufacturer's name or his trademark, or (if legally protected) his identification number, by one of the three following methods:

   1) printed tape within the cable;

   2) printing, indenting or embossing on the insulation of at least one core. Any core may be chosen;

   3) printing, indenting or embossing on the sheath, if any.

NOTE Special marking applies to Extensible Leads. The details are given in EN 50525-2-12.

6.2 Continuity of marking

Each specified marking shall be regarded as continuous if the distance between the end of the mark and the beginning of the next identical mark does not exceed:

a) 550 mm if the marking is on the outer sheath of the cable;

b) 275 mm if the marking is:

   1) on the insulation of an unsheathed cable;

   2) on the insulation of a sheathed cable;

   3) on a tape within a sheathed cable.

NOTE 1 A "Specified Marking" is any marking that is prescribed as a normative requirement by this Part 1 of the EN or by particular requirements of the particular specification in Part 2 or Part 3 onwards of EN 50525.

NOTE 2 Other marking, such as that required under recognised voluntary third party approval schemes, may also follow the requirements of this subclause.

Figure 1 below shows an example of the marking as used on the outer sheath of the cable.

Dimensions in millimetres

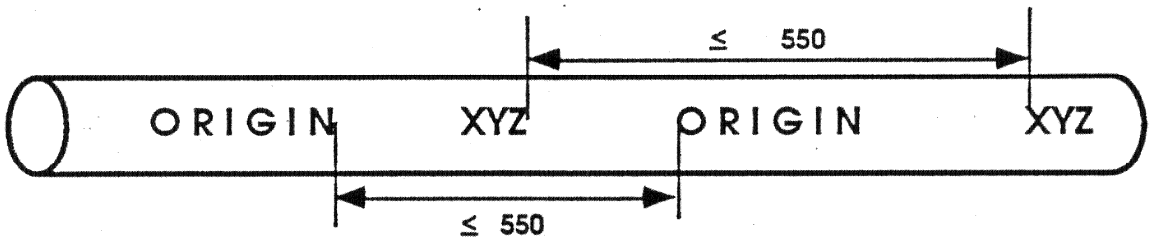

Figure 1

6.3 Use of the name CENELEC

The name CENELEC, in full or abbreviated, shall not be marked on, or in, the cables.

6.4 Code designation

Each cable shall have its full code designation according to HD 361 marked continuously (see 6.2) on the sheath or on the insulation of one core.

NOTE For sheathed cables, external marking is preferred.

The code designation for each cable is given in the particular specifications in Parts 2 and 3 of this EN.

6.5 Additional voluntary marking

Additional markings, for example the number of cores, the cross-sectional area of the conductor, and the year of manufacture, are permitted, but are not requirements of this standard.

If an additional marking is applied it shall neither conflict nor interfere with the required markings in 6.1 and 6.4, or with markings required in a particular specification.

Any additional voluntary marking shall be throughout the length of the cable, and shall be either on the external surface of the cable, or by means of tape within the cable, or by a combination of these methods.

Such markings, which are permitted to be applied on the same line as the obligatory marking, or on an additional line, shall be repeated at intervals not exceeding 1 100 mm.

6.6 Additional requirements

6.6.1 Durability

Printed markings shall be durable. Compliance with this requirement shall be checked by the test given in 5.1 of EN 50396.

6.6.2 Legibility

All markings shall be legible.

The colours of the identification threads shall be easy to recognise or easily made recognisable, if necessary by cleaning with any permitted safe petroleum-based solvent.

7 Tests on completed cables

7.1 General

The tests to be carried out on completed cables shall be listed in the particular specification. Each test shall be designated as a Type Test (T); Sample Test (S) or Routine Test (R).

7.2 Electrical requirements

The cables shall have adequate dielectric strength and insulation resistance.

Compliance shall be checked by carrying out the relevant tests using the methods specified in Table 1. The cables shall meet the requirements shown in Table 1.

NOTE 1 Not all cables in the particular specifications require all the tests to be carried out.

NOTE 2 Different requirements apply to single core welding cables rated 100/100 V. The details are given in the particular specification.

Where single core cables, whether sheathed or unsheathed, are spark tested in accordance with EN 50395, 10.2 and the thickness of the insulation, or the insulation and sheath combined, is greater than 3 mm the test voltage shall be either 19 kV a.c. or 28 kV d.c.

Table 1 – Requirements for electrical tests for cables

1	2	3	4	5	6	7
Ref No	**Test**	**Unit**	**Test method described in EN 50395**	**Rated voltage of cables**		
			Clause	**300/300 V**	**300/500 V**	**450/750 V**
1	**Measurement of the resistance of conductor**		5			
1.1	Values to be obtained, max.			[a]	[a]	[a]
2	**Voltage test on completed cable**		6			
2.1	Test conditions:					
	- minimum length of the sample	m		20	20	20
	- minimum period of immersion in water	h		1	1	1
	- temperature of the water	°C		20 ± 5	20 ± 5	20 ± 5
2.2	Voltage applied (a.c.)	V		2 000	2 000	2 500
2.3	Duration of each application of voltage, minimum	min		15	15	15
2.4	Result to be obtained			No breakdown	No breakdown	No breakdown
3	**Voltage test on cores**		7			
3.1	Test conditions:					
	- length of sample	m		5	5	5
	- minimum period of immersion in water	h		1	1	1
	- temperature of the water	°C		20 ± 5	20 ± 5	20 ± 5
3.2	Applied voltage (a.c.) according to specified thickness of insulation:					
	- up to and inc. 0,6 mm	V		1 500	1 500	-
	- exceeding 0,6 mm	V		2 000	2 000	2 500
3.3	Duration of each application of voltage, minimum	min		5	5	5
3.4	Result to be obtained			No breakdown	No breakdown	No breakdown

Table 1 – Requirements for electrical tests for cables *(continued)*

1	2	3	4	5	6	7
Ref No	**Test**	**Unit**	**Test method described in EN 50395**	**Rated voltage of cables**		
			Clause	**300/300 V**	**300/500 V**	**450/750 V**
4	**Measurement of insulation resistance**					
4.1	Cables ≤ 90 °C		8.1			
4.1.1	Test conditions:					
	- length of sample from the previous voltage test (ref. 2 or 3)	m		5	5	5
	- minimum period of immersion in hot water	h		2	2	2
	- temperature of the water	°C		[b]	[b]	[b]
4.1.2	Result to be obtained	MΩ		[b]	[b]	[b]
4.2	Cables > 90 °C		8.2			
4.2.1	Test conditions:					
	- length of sample from the previous voltage test (ref. 2 or 3)	m			1,40 (from original 5)	1,40 (from original 5)
	- minimum period of heating	h			2	2
	- temperature of heating	°C			[b]	[b]
4.2.2	Result to be obtained	MΩ			[b]	[b]
5	**Long term resistance of insulation to d.c.**		9			
5.1	Test conditions:					
	- length of sample	m		5	5	5
	- duration of test	h		240	240	240
	- water temperature	°C		60 ± 5	60 ± 5	60 ± 5
	- d.c. voltage applied	V		220	220	220
5.2	Result to be obtained			No breakdown or damage to the surface		
6	**Check on absence of faults on insulation**					
6.1	Spark test		10.2			
6.1.1	Test condition			[c]	[c]	[c]
6.1.2	Result to be obtained			No breakdown	No breakdown	No breakdown
6.2	Voltage test		10.3			
6.2.1	Test conditions:			[c]	[c]	[c]
	- voltage applied, a.c.	V		2 000	2 000	2 500
	- voltage applied, d.c.	V		5 000	5 000	5 000
	- duration of test	min		5	5	5

Table 1 – Requirements for electrical tests for cables *(concluded)*

1	2	3	4	5	6	7
Ref No	**Test**	**Unit**	**Test method described in EN 50395**	**Rated voltage of cables**		
			Clause	**300/300 V**	**300/500 V**	**450/750 V**
6.2.2	Result to be obtained			No breakdown	No breakdown	No breakdown
7	**Surface resistance of sheath**		11			
7.1	Test conditions:					
	- voltage applied, d.c.	V		100 to 500	100 to 500	100 to 500
	- duration of test	min		1	1	1
7.2	Result to be obtained	Ω		$\geq 10^9$	$\geq 10^9$	$\geq 10^9$

[a] See EN 60228 and particular specifications.

[b] See tables in the particular specifications.

[c] See test method referred to in column 4.

7.3 Overall dimensions

The mean overall dimensions of the cables shall be within the limits specified in the tables in the particular specifications.

The difference between any two values of the overall diameter of sheathed circular cables at the same cross-section (ovality) shall not exceed 15 % of the upper limit specified for the mean overall diameter.

Compliance shall be checked by the tests given in 4.4 of EN 50396.

7.4 Mechanical strength of flexible cables

Flexible cables shall be capable of withstanding bending and other mechanical stresses occurring in normal use.

Details of the tests, and requirements to be met, are given in Annex A.

7.5 Assessment of halogens

Where a particular specification requires an assessment of halogens, such as for cables described as “Halogen-free”, the procedure described in Annex B shall be used.

8 Guide to use of the cables

See HD 516.

NOTE HD 516 includes current ratings for flexible cables.

Annex A
(normative)

Mechanical tests – Requirements for flexible cables

A.1 Two-pulley flexing test

A.1.1 Applicability

The test applies to multicore flexible cables having conductors of a cross-sectional area:

a) up to and including 4 mm^2 for cables with crosslinked insulation;

b) up to and including 2,5 mm^2 for cables with thermoplastic insulation.

A.1.2 Requirements

The test shall be carried out in accordance with 6.2 of EN 50396. During the test with 30 000 cycles, i.e. 60 000 single movements, neither interruption of the current, short circuit between the conductors nor short circuit between the cables and pulleys (the flexing apparatus) shall occur.

After the required number of cycles, the sheath of a sheathed cable shall be examined under normal or corrected vision. There shall be no point at which any underlying component of the cable (for instance inner sheath, tapes, insulated cores, etc.) shall be visible through a break in the sheath. The sheath of the cable shall then be removed.

The cores from the cable without its sheath, or of a non-sheathed cable, shall then withstand the voltage test carried out in accordance with Clause 7 of EN 50395, but with a test voltage not exceeding 2 000 V.

A.2 Wear resistance test

A.2.1 Applicability

The test applies to cables having an overall textile braid covering.

A.2.2 Requirements

The test shall be carried out in accordance with 6.6 of EN 50396. After 20 000 single strokes, the insulation of the fixed sample shall not be visible over a total length of more than 10 mm.

After this test, the fixed sample shall withstand the voltage test in accordance with Clause 6 of EN 50395.

A.3 Three-pulley test

A.3.1 Applicability

The test applies to cables designed for applications requiring high flexibility.

A.3.2 Requirements

The test shall be carried out in accordance with 6.3 of EN 50396. During the test with 2 000 cycles, i.e. 4 000 single movements, neither interruption of the current, short circuit between the conductors nor short circuit between the cable and the pulleys (the flexing apparatus) shall occur.

After the required number of cycles the sheath of the cable, if any, shall be removed. The cores shall then withstand the voltage test carried out in accordance with Clause 7 of EN 50395, but with a test voltage not exceeding 2 000 V.

A.4 Kink test

A.4.1 Applicability

The test applies to cables designed for applications requiring high flexibility.

A.4.2 Requirements

The test shall be carried out in accordance with 6.5 of EN 50396. During the test with 1 500 cycles, i.e. 3 000 single movements, neither interruption of the current, nor short circuit between the conductors shall occur.

Also there shall be no damage (cracking or tearing) to the sheath or any outer covering (textile braid). Textile braids shall have no gap bigger than 2 mm.

At the conclusion of the test the sheath and any outer covering shall be removed, and the cores shall be subjected to the voltage test on cores specified in Table 1.

A.5 Test for separation of cores

A.5.1 Applicability

This test applies to cables with divisible cores as detailed in the particular specifications.

A.5.2 Requirements

The test shall be carried out in accordance with 6.8 of EN 50396. The force shall be between 3 N and 30 N.

After separation there shall be no damage to the integrity of the insulation.

Annex B
(normative)

Assessment of halogens

B.1 Requirements for extruded material

The insulation and sheath shall meet the following requirements:

a) Type test

The material shall be tested to all the tests in Table B.1.

Table B.1 – Test method, measurement, requirements

	Test method	Measurement	Requirements
1	EN 50267-2-2	pH and conductivity	pH ≥ 4,3 and conductivity ≤ 10 µS/mm
2	EN 50267-2-1	Chlorine and bromine content expressed as HCl	≤ 0,5 %
3a	EN 50525-1 Annex C	Halogen: fluorine	If negative: stop test; no further test needed. Accept material.
			If positive: do test according to 3b.
3b	EN 60684-2	Fluorine content	≤ 0,1 %

b) Sample test

The material shall be tested to the sequential test programme in Table B.2.

Table B.2 – Sequential test programme

	Test method	Measurement	Result	Outcome
Stage 0	EN 50525-1 Annex C	Halogen: Fluorine, Chlorine and Bromine		If negative: stop test; no further test needed Accept material
				If positive: continue with stage 1
Stage 1	EN 50267-2-2	pH	< 4,3	Reject material
			≥ 4,3	Evaluate conductivity
		Conductivity	≤ 2,5 µS/mm	Accept material No further testing needed
		Conductivity	> 10 µS/mm	Reject material
		Conductivity (s)	> 2,5 µS/mm but ≤ 10 µS/mm	Test to EN 50267-2-1
Stage 2	EN 50267-2-1	Chlorine and bromine Content expressed as HCl	> 0,5 %	Reject material
			≤ 0,5 %	Test to EN 60684-2
Stage 3	EN 60684-2	Fluorine content	> 0,1 %	Reject material
			≤ 0,1 %	Accept material

B.2 Requirements for non-extruded materials

Type and sample test

The materials shall meet the following requirements:

If the combined mass of all non-extruded materials (including separator tapes and fillers) is ≤ 5 % wt/wt of the total combustible material in the cable, the test to EN 50267-2-2 (Table B.1, No 1) shall be carried out on each component of materials. Each component shall meet the requirements for pH and conductivity of ≥ 4,3 and ≤ 10 µS/mm, respectively.

A layer comprising a number of tapes of the same material shall be regarded as one component.

If the combined mass of separator tapes and fillers is > 5 % wt/wt of the total combustible materials, then each of the components shall meet the requirements for extruded material according to Table B.1.

For the test according to 3a of Table B.1, the sample may be prepared from all tapes. If the result is positive, it must be repeated on each component.

Annex C
(normative)

Determination of halogens – Elemental test

WARNING – Owing to its potentially hazardous nature, the fusion operation should be carried out in a fume cupboard, using a safety screen.

C.1 Equipment

Bunsen burner.

3 small/medium soda glass test tubes (approximately 50 mm × 10 mm).

Test tube holder.

Evaporating basin/mortar.

Wire gauze.

Funnel.

Filter paper.

C.2 Materials

Unknown sample

Sodium metal

Dilute nitric acid (5 %)

Aqueous silver nitrate (5 %)

Dilute ammonia (10 %)

Freshly made up zirconium-alizarin red S reagent

Glacial acetic acid

Acid/pH indicator papers

C.3 Procedure

C.3.1 Sodium fusion

Place 200 mg to 250 mg of the sample into the bottom of a small soda glass test tube. Add 10 ml of distilled/de-ionized water to the evaporating basin and place this in the fume cupboard behind the safety screen. Whilst holding the test tube firmly with the test tube holder at an angle of 45° to 60° to the vertical, introduce a piece of freshly cut, clean sodium (about the size of a small pea) (200 mg to 250 mg) into the mouth of the test tube without allowing it to come into contact with the sample. With the safety screen in place, heat the sodium gently until it melts and runs down on to the sample (there may be a vigorous reaction when the molten sodium reaches the sample if halogens are present). Heat the tube gently for about 1 min, then more strongly until the lower 20 mm of the tube glows red hot. Plunge the red hot tube into the water in the evaporating basin, immediately placing the gauze on top. (The gauze prevents any loss of material when the tube shatters on contact with the water.) Allow any unreacted sodium to react before grinding up the solution and glass. Filter, and separate the filtrate into two equal portions.

C.3.2 Chlorine and Bromine

To the first portion of the filtrate, add sufficient nitric acid to make the solution acidic. Boil this solution until its total volume has been reduced by half (this is to remove any HCN or H_2S, if present, which would interfere with the test). Add 1 ml silver nitrate solution; a white or yellowish-white precipitate indicates the presence of halogen (Cl, Br) in the original sample. (If the liquor is decanted, and the precipitate is white and readily soluble in dilute ammonia, then chloride is present.)

C.3.3 Fluorine

To the second portion of the filtrate, acidify with glacial acetic acid. Boil this solution until its total volume has been reduced by half. Add two to three drops freshly prepared zirconium lake reagent (equal volumes of: a) Alizarin solution: 0,05 g Alizarin Red-S in 50 ml distilled water; b) Zirconium solution: 0,05 g zirconium nitrate in 10 ml concentrated HCl diluted with 50 ml distilled water). Heat at 40 °C for 1 h. The presence of fluoride is indicated by the red/pink colouration being bleached to yellow.

Annex D
(normative)

Requirements for core identification of multicore cables with more than five cores

D.1 Core identification

Core identification shall be either by: a) Marking by inscription; or b) Colour coding (pilot and marker system), except that where a protective earth conductor is included in the cable it shall always be a green-and-yellow core placed in the outer layer.

D.2 Marking by inscription

With the exception of any green-and-yellow earth core which, if included, shall be placed in the outer layer, all cores in the cable shall be marked by inscription according to EN 50334. The base colour shall be black and the inscription colour shall be white or yellow.

D.3 Colour coding (pilot and marker system)

In each layer, two adjacent cores shall be distinctively coloured, with all other cores of the same colour as each other.

For cables including a protective earth conductor one core coloured green-and-yellow shall replace one of the two distinctively coloured cores in the outer layer only.

Annex E
(informative)

Structure and content of EN 50525 and its derivation from HD 21 and HD 22

NOTE The purpose of this annex is to show the position at the time of conversion of HD 21 and HD 22 to ENs. It is not intended to maintain this annex to show changes after the publication of EN 50525.

Table E.1 – General structure of EN 50525

Title	Part	Generic insulation type
General requirements	1	-
Cables for general applications	2	-
Flexible cables	2-1x	Thermoplastic types
	2-2x	Crosslinked types
Fixed wiring – non-sheathed single core	2-3x	Thermoplastic types
	2-4x	Crosslinked types
Fixed wiring – sheathed	2-5x	Thermoplastic types
	2-6x	(Reserved for crosslinked types)
Special applications	2-7x	Thermoplastic types
	2-8x	Crosslinked types
Cables with special fire performance	3	-
Flexible cables	3-1x	Thermoplastic halogen-free types
	3-2x	Crosslinked halogen-free types
Fixed wiring – non-sheathed single core	3-3x	Thermoplastic halogen-free types
	3-4x	Crosslinked halogen-free types

Table E.2 – Specific structure of EN 50525 and its derivation from HD 21 and HD 22

Part number of EN 50525	Short title	Derivation
1	General requirements	HD 21.1; HD 22.1
2-11	PVC flexible cables	HD 21.5; HD 21.12
2-12	Extensible leads	HD 21.10
2-21	Rubber flexible cables	HD 22.4; HD 22.10; HD 22.11; HD 22.12; HD 22.16
2-22	Braided flexible cables	HD 22.14 (Clause 6)
2-31	PVC conduit wire	HD 21.3; HD 21.7
2-41	Rubber single core – SiR	HD 22.3
2-42	Rubber single core – EVA	HD 22.7
2-51	PVC sheathed wiring	HD 21.13
2-71	Tinsel flexible cables	HD 21.5 (Clause 2)
2-72	PVC separable flat	HD 21.11
2-81	Welding cable	HD 22.6
2-82	Lighting chains	HD 22.8
2-83	SiR flexible	HD 22.15
3-11	Halogen-free flexible (T/P)	HD 21.14
3-21	Halogen-free flexible (X/L)	HD 22.13
3-31	Halogen-free single core (T/P)	HD 21.15
3-41	Halogen-free single core (X/L)	HD 22.9

Table E.3 – Location of each part of HD 21 and HD 22

HD number	Title of specific part	Location (in part of EN 50525 unless stated)
HD 21.1 S4	General requirements	1
HD 21.2 S3	Test methods	EN 50395 and EN 50396
HD 21.3 S3	Non-sheathed cables for fixed wiring	2-31
HD 21.4 S2	Sheathed cables for fixed wiring	Withdrawn
HD 21.5 S3	Flexible cables (cords)	2-11
HD 21.6	(Spare)	n/a
HD 21.7 S2	Single core non-sheathed cables for internal wiring for a conductor temperature of 90 °C	2-31
HD 21.8 S2	Single core non-sheathed cables for decorative chains	Withdrawn
HD 21.9 S2	Single core non-sheathed cables for installation at low temperatures	Withdrawn
HD 21.10 S2	Extensible leads	2-12
HD 21.11 S1	Cables for luminaires	2-72
HD 21.12 S1	Heat-resistant flexible cables (cords)	2-11
HD 21.13 S1	Oil resistant PVC sheathed cables with two or more conductors	2-51
HD 21.14 S1	Flexible cables (cords), insulated and sheathed with halogen-free thermoplastic compounds	3-11
HD 21.15 S1	Single core cables, insulated with halogen-free thermoplastic compound, for fixed wiring	3-31
HD 22.1 S4	General requirements	1
HD 22.2 S3	Test methods	EN 50395 and EN 50396
HD 22.3 S4	Heat resistant silicone rubber insulated cables	2-41
HD 22.4 S4	Cords and flexible cables	2-21
HD 22.5	(Spare)	n/a
HD 22.6 S2	Arc welding cables	2-81
HD 22.7 S2	Cables with increased heat resistance for internal wiring for a conductor temperature of 110 °C	2-42
HD 22.8 S2	Polychloroprene or equivalent synthetic elastomer sheathed cable for decorative chains	2-82
HD 22.9 S3	Single core halogen-free non-sheathed cables for fixed wiring having low emission of smoke	3-41
HD 22.10 S2	EPR insulated and polyurethane sheathed flexible cables	2-21
HD 22.11 S2	EVA cords and flexible cables	2-21
HD 22.12 S2	Heat resistant EPR cords and flexible cables	2-21
HD 22.13 S2	Halogen-free flexible cables having low emission of smoke	3-21
HD 22.14 S3	Cords for applications requiring high flexibility	2-22
HD 22.15 S2	Multicore cables insulated and sheathed with heat resistant silicone rubber	2-83
HD 22.16 S2	Water resistant polychloroprene or equivalent synthetic elastomer sheathed cables	2-21

Bibliography

The following documents are referred to in the text for information.

HD 21	Series	Cables of rated voltages up to and including 450/750 V and having thermoplastic insulation
HD 22	Series	Cables of rated voltages up to and including 450/750 V and having cross-linked insulation
HD 516 [1)]		Guide to use of low voltage harmonized cables
HD 402		Standard colours for insulation for low-frequency cables and wires (IEC 60304)
HD 60364	Series	Low-voltage electrical installations (IEC 60364 series)
EN 50525-2	Series	Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) – Part 2: Cables for general applications
EN 50525-3	Series	Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) – Part 3: Cables with special fire performance
EN 60445		Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors
CLC/TR 62125		Environmental statement specific to TC 20 – Electric cables

1) Under revision.

This page deliberately left blank

National Annex NA (informative) – Specific structure of BS EN 50525 and its derivation from British Standards and from HD 21 and HD 22

Part number of BS EN 50525	Short title	Derivation		
		BS	Table No(s)	HD
1	General requirements	(Note 1)	(Note 1)	HD 21.1; HD 22.1
2-11	PVC flexible cables	BS 6500 BS 7919	26, 27, 28, 29 40, 41	HD 21.5; HD 21.12
2-12	Extensible leads	BS 6500	Clause 8	HD 21.10
2-21	Rubber flexible cables	BS 6500 BS 7919	12, 13, 15, 16 10-17, 20, 21, 23, 24	HD 22.4; HD 22.10; HD 22.11; HD 22.12; HD 22.16
2-22	Braided flexible cables	–	–	HD 22.14 (Clause 6)
2-31	PVC conduit wire	BS 6004	4a), 4b), 5, 11a), 11b), 12	HD 21.3; HD 21.7
2-41	Rubber single core – SiR	BS 6007	8, 9, 10	HD 22.3
2-42	Rubber single core – EVA	BS 6007	3, 4, 5, 6, 7	HD 22.7
2-51	PVC sheathed wiring	BS 6004 BS 7919	13 42, 43	HD 21.13
2-71	Tinsel flexible cables	BS 6500	24	HD 21.5 (Clause 2)
2-72	PVC separable flat	–	–	HD 21.11
2-81	Welding cable	BS 638-4	1, 2	HD 22.6
2-82	Lighting chains	–	–	HD 22.8
2-83	SiR flexible	BS 7919	22	HD 22.15
3-11	Halogen-free flexible (T/P)	–	–	HD 21.14
3-21	Halogen-free flexible (X/L)	BS 7919	18, 19	HD 22.13
3-31	Halogen-free single core (T/P)	–	–	HD 21.15
3-41	Halogen-free single core (X/L)	BS 7211	3a), 3b), 4a), 4b)	HD 22.9

Note 1 – General requirements were given in each relevant BS as appropriate

© BSI 2011

National Annex NB (informative) – Standard United Kingdom reference codes

The United Kingdom has used its own cable reference system for many decades, as well as the new European coding system. As an aid to users of the BS EN 50525 series of specification, a cross-reference table for purely the common standard cables follows in order to limit confusion in the future.

United Kingdom cable code	Harmonized cable code	Cable standard
300/500V PVC Insulated only		
2491X	H05V-U	BS EN 50525-2-31
2491X	H05V-K	BS EN 50525-2-31
450/750V PVC Insulated only		
6491X	H07V-U	BS EN 50525-2-31
6491X	H07V-R	BS EN 50525-2-31
6491X	H07V-K	BS EN 50525-2-31
300/300 V PVC flexible		
2182/3/4 Y (circular)	H03VV-F 2/3/4	BS EN 50525-2-11
2192 Y (flat)	H03VVH2-F	BS EN 50525-2-11
300/500 V PVC flexible		
3182/3/4/5 Y (circular)	H05VV-F 2/3/4/5	BS EN 50525-2-11
3192 Y (flat)	H05VVH2-F	BS EN 50525-2-11
300/500V Low smoke Insulated only		
2491B	H05Z-U	BS EN 50525-3-41
2491B	H05Z-K	BS EN 50525-3-41
450/750V Low smoke Insulated only		
6491B	H07Z-U	BS EN 50525-3-41
6491B	H07Z-R	BS EN 50525-3-41
6491B	H07Z-K	BS EN 50525-3-41
300/300 V Low Smoke flexible		
2182/3/4 B (circular)	H03Z1Z1-F 2/3/4	BS EN 50525-3-11
2192 B (flat)	H03Z1Z1H2-F	BS EN 50525-3-11
300/500 V Low Smoke flexible		
3182/3/4/5 B (circular)	H05Z1Z1-F 2/3/4/5	BS EN 50525-3-11
3192 B (flat)	H05Z1Z1-H2-F	BS EN 50525-3-11

Note.

U means Solid Conductor

R means rigid stranded conductor

K means flexible conductor for fixed installations.

F means flexible conductor for flexible applications

This page deliberately left blank

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

All the data, software and documentation set out in all British Standards and other BSI publications are the property of and copyrighted by BSI, or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI. Details and advice can be obtained from the Copyright & Licensing Department.

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™