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Application Guide

ECA
Representing the best in electrical engineering and building services

Cables and CPR

June 2017

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Contents

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1. What is CPR?

The Construction Products Regulation (CPR) govern the marketing of construction products and materials throughout the European Economic Area, including the European Union (EU). The regulations are formally known as EU 305/2011.

The aim of the CPR is to categorise information regarding the safety and performance of products in various construction situations.

Within CPR, a 'construction product' is defined as;

> *'Any product or kit which is produced and placed on the market for incorporation in a permanent manner in construction works or parts thereof and the performance of which has an effect on the performance of the construction works with respect to the basic requirements for construction'*

CPR introduced and adopted in 2011, became mandatory from 1st July 2013. This EU Regulation is effectively law, and lays down requirements that must be met regarding how products and materials used within the construction industry are first placed on the market and made available.

It applies to products intended to be permanently installed within buildings.

The CPR effectively replaced the old Construction Products Directive (CPD). This was necessary as CPD could not be applied in a harmonised manner throughout the EU.

As such, the new CPR could be made to apply directly in all Member States, without the need for national interpretation, with the overriding objective of removing barriers to trade.

CPR thus imposes legal requirements on manufacturers, distributors, importers and suppliers who market any applicable product within the EU.

An obvious benefit of working under the CPR is that it enables designers, specifiers and other industry professionals, as well as consumers, to compare the performance of products that may have emanated from different manufacturers from different countries. In other words it enables 'like for like' comparisons to be made more easily.

2. How does it affect the electrotechnical industry & cables in particular ?

A present, cables are the only electrotechnical product directly listed under CPR.

Where the cable may be expected to be used in manner where it is to be permanently installed within a building, then compliance with respect cable classification must be met.

The requirement to bring cabling under the CPR first came into effect on 10th June 2016, this date being known as the 'Date of Applicability' (DoA); the beginning of a 12 month transition period.

From that date onwards, cable manufacturers had the option to make a 'Declaration of Performance' (DoP) relating to their products against the classifications within the harmonised European Standard EN 50575:2014 (a European standard covering cables and their reaction to fire) and also apply CЄ marking – with particular regards to the product and its **reaction to fire**.

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'***Reaction to fire' in this context is taken to mean propagation and spread of flames, the generation of smoke, heat release, production of acidic and corrosive gases and production of flaming droplets.***

A recent listing in the Official Journal of the European Union (OJEU) now gives a further date – namely 1st July 2017. From this date onwards, the manufacturer, distributor or importer must make a DoP and apply CЄ marking in relation to relevant cables. (i.e. those being envisaged as likely to be permanently installed within building). This is the end of the so-called 'transition period', and marks the start of the CPR for cables being a legal requirement in the UK, under statutory instrument number 1387.

As regards such cables, as well as being permanently installed within buildings, the CPR lists specifically that the requirement applies equally to;

- Power cables
- Control cables
- Communication Cables

At the end of the transition period - i.e. onwards from 1st July 2017, only cables which have a European Classification under the standard, EN 50575:2014, can be legally sold within the EU.

Conversely after that date, cables which do not have a European Classification in respect of the standard cannot legally be sold anywhere on the European Market.

It is worth pointing out that in the case of cable that has been legally placed on the European market before the 1st July 2017, and is in perhaps the stock of a distributor, wholesaler, or contractor such cable does not have to be CPR compliant. There are currently no published timescales regarding dates by which such cable must be installed or 'used up'

3. So what about Brexit?

At the time of writing (May 2017), despite the UK's Brexit vote of June 2016, it is understood that CЄ marking will remain a pre-requisite for any manufacturer, importer or distributor wishing to sell their cables within the EU.

All that is currently known is that CPR will still apply to all construction sales in the EU and the UK, up until the point any such decision is made.

4. Cables and fire

Fires can have a high cost – both in loss of life and the loss of property, as well as other consequential losses.

As many fires originate within buildings, clearly the type of cable installed and its behaviour during a fire can be critical.

Furthermore, UK Government research concluded that:

> *'the most commonly identified cause of death from a fire incident is being overcome by gas or smoke'*

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The vast majority of cables currently available in the UK employ some form of synthetic material to act as the insulation, and/or bedding and sheathing. Such materials are usually based on hydrocarbons and will contain oils and other chemicals in their manufacture.

It is how these synthetic materials behave in a fire situation and during combustion, that causes the greatest concern from a fire safety perspective, and it is only these topics that the CPR relating to cables initially sets out to address.

For example, normal PVC insulated cables, common since the 1950s, in event of fire may burn to produce a dense black smoke and acidic gases. In addition, the PVC can also act as a fuel, and can propagate flame along the cable and potentially through a building and its voids, a situation exacerbated by melting and production of flaming droplets.

In terms of a building services installation, the dense black smoke produced during such combustion can sometimes inhibit building occupants trying to escape, or persons attempting to fight the fire - by blocking visibility through exit routes, as well as reducing the effectiveness of any emergency or escape lighting.

The acidic gases given off during such combustion may also impede or prevent escape and fire fighting actions by causing choking or even vomiting of persons.

Another less immediately obvious dangerous side effect of these acidic gases may be corrosive damage to metallic components – often within electrical and electronic equipment.

These effects were first recognised some years ago, and various types of cables introduced with modified types of insulation material, with claimed reduction in halogens, smoke or fume characteristics when subject to combustion. These were often colloquially known or marketed as ‘LSF’ (low smoke and fume) and ‘LS0H’ (low smoke zero halogen).

Such cable classification was a step in the right direction but confusion often arose, because the terms are often manufacturer-specific, very often mis-quoted and not fully understood by all.

The new CPR goes further and requires more detailed, standardised classifications - hopefully to end confusion.

5. Reaction to fire versus resistance to fire

Before considering the new CPR requirements further, it is firstly vital to distinguish categorically between two different properties regarding cables and fire situations.

‘Reaction to fire’ – describes a cable’s behaviour during combustion, as well as how it will potentially contribute to developing or spreading / propagating the fire.

‘Resistance to fire’ – is completely different, and describes the cable’s ability to continue operating as normal – regarding its ability to maintain circuit integrity during a fire situation – often referred to as ‘fire survival’.

The new CPR presently is only concerned with a cable’s reaction to fire characteristic, with the cable having to meet and be tested to the requirements set out in the European Standard EN 50575.

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At the time of writing (May 2017), the CPR in terms of cables and resistance to fire is still under development and understood to be some time away before coming into effect.

Until it is completed, cables with resistance to fire, (often manufactured to BS 7629-1:2015 and commonly employed in some fire alarm and emergency lighting systems) are outside the scope of EN 50575 and as such will be currently outside the scope of the CPR.

6. What will CPR mean to cable manufacturers?

Under CPR the manufacturer must –

- Apply a CЄ mark to signify that the cable is consistent with its declaration of performance (DoP). This should be on the label or packaging, but not necessarily on the cable itself.
- Make a Declaration of Performance (DoP) with regards reaction to fire
- Take on legal responsibility for the performance of the cable to its declared performance

Issue a DoP based on third party testing, from an official notified body, for example BASEC.
(BASEC being a third party accreditation and certification body for cables)

7. What will CPR mean to cable importers?

Under CPR, importers must –

- Ensure that any such cable they import is CPR compliant and carries a DoP and CЄ labelling
- Ensure on any packaging that their registered trade name, mark and contact address is shown
- Carry out sample testing of the cables, and keep registers of complaints, non-conformities and any product recalls.
- Ensure that all copies of DoPs for all products supplied are kept for 10 years
- Assist all market surveillance authorities by providing any requested documentation

8. What will CPR mean to cable distributors, suppliers and wholesalers?

Under CPR, these parties must –

- Ensure that all such cables that they supply after 1st July 2017 carry the correct CЄ labelling
- Ensure that the manufacturer / importer has met and complied with all CPR requirements
- Not supply any product that may be suspected as not fully meeting CPR

Withdraw from sale or recall any product they believe does not meet CPR

9. What will CPR mean to electrical designers and specifiers?

Under CPR, such designers / specifiers must –

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- Ensure that all non fire-resistant cables intended for permanent installation within a building are CPR compliant
- Specify the correct and appropriate cable classification for the relevant parts of all projects
- Consider where possible, Euro classes specified by other designers for items such as window frames, lining materials, fixed furnishings, etc. and align cable specifications to these
- Liaise with any other known cable specifiers for the project (such as specialist datacoms, alarms, CCTV, etc) to consider a minimum acceptable cable classification achievable for all such cabling systems
- Request that evidence be sourced and kept to identify correctly classified cable has actually been installed on a project
- Ensure that under the relevant classification, appropriate third party accreditation, by an independent third party accreditation scheme, such as BASEC has taken place

10. What will CPR mean to cable installers?

Under CPR, cable installers must –

- Carefully study specifications and drawings and note the cable classification required for all parts of all projects
- Specifically procure correctly categorised cable from distributors, relevant to the project demands
- Ensure that all cables delivered to and installed on site meet the specified requirements
- Keep records of cable labelling from cable drums and the like, and provide with handover documentation
- Where also acting as the 'designer' to meet the obligations detailed in the section above

11. Classifications of cables under CPR

Euro classification under CPR, will replace IEC 60332-1-2: 2004, which is the existing means of benchmarking the flammability of cables. However, as the methods of testing are different, as well as the categories, direct comparisons against the old standard will not be straightforward.

For reaction to fire performance under CPR, a series of seven 'Euro Classes' reflecting real life environments have been established. These are as follows:

- A^{CA} does not contribute to fire propagation / heat emission
- $B1^{CA}$ minimum contribution to fire propagation / heat emission
- $B2^{CA}$ very limited contribution to fire propagation / heat emission
- C^{CA} combustible - limited contribution to fire propagation / heat emission
- D^{CA} combustible - average contribution to fire propagation / heat emission
- E^{CA} combustible - high contribution to fire propagation / heat emission
- F^{CA} undetermined contribution to fire propagation / heat emission

These seven classes generally align with the classes A to F used for construction products, and already referred to in UK Building Regulations.

It can be seen that class A_{CA} would be the 'best' cable as regards resisting fire spread and heat emission,

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a good practical example being bare mineral insulated copper-clad cable (MICC).

Conversely, class F_{CA} would be seen as the 'worst', as it actively burns and gives off heat and toxins. An example here may be a completely unbranded cable, from unknown origins carrying no identification markings or labelling.

Class F_{CA} would therefore be appropriate to cables emanating from a manufacturer, whose product(s) lack any requirements related to fire reaction.

In addition to the flame propagation (flammability) classes outlined above, there are three other sub categories of cable fire performance for the classes $B1_{CA}$ to D_{CA}.

These cover:

Smoke emission properties, detailing opacity (obscuring properties) of emitted smoke

s 1	little smoke production, and slow smoke propagation	(best)
s 1a	transmittance of light through the smoke > 80 %	
s 1b	transmittance of light through the smoke > 60 % but < 80 %	
s 2	average smoke production and propagation	
s 3	none of the above	(worst)

Droplets of particles that burn, giving information of dripping of burning materials

d 0	no burning droplets or particles	(best)
d 1	no burning or particles that last more than 10 seconds	
d 2	none of the above	(worst)

Acidity performance, providing information about the emission of acid gases during the fire

a 1	conductivity < 2.5µS/mm and pH > 4.3	(best)
a 2	conductivity < 10µS/mm and pH > 4.3	
a 3	none of the above	(worst)

So a full Euro Class designation for a particular cable would be (class + smoke + droplets + acidity), and might look something like this:

$B2_{CA}$ – s1 d1 a1

In theory, there can be any combination or permutation of the four performance categories, but only a few will be practical to manufacture, and one particular performance measure, may well influence and govern the others.

To meet the requirements for CЄ marking under CPR, these full cable classifications must appear on all packaging used to market the cable, as well as being accompanied by additional information that is required in the harmonised standard. Note however, it is not a compulsory requirement for the marking to appear on the cable itself, although some manufacturers may choose to do so, as it has been voluntary practice in some countries.

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12. Selection of the appropriate cable category

At the time of writing, it is known that decisions on which Euro Class to adopt for a particular application already varies between different European member states, for different applications.

Consensus of opinion thus far from European member states is that Euro Classes B_{CA} through to E_{CA} are considered to be low fire hazard, and are practical cables to specify and install.

In all cases, it will need to be the responsibility of the designer /cable specifier to select the appropriate classification of cable required.

12.1 Overall Design Considerations

First and foremost, it should be remembered that the new requirements of CPR and specifying the appropriate Euro Class of cable:

- Apply only to fixed cables to be installed in a building
- Apply equally to any such cable, be it carrying electrical power, any type of alarm signals, or any form of data communications
- Do not apply at present to cables needing to maintain circuit integrity during a fire situation

Addressing the first point, this would effectively mean that cables to be intended to be run outside buildings, or be buried in the ground for example, would be exempt from the requirements. However, careful consideration would have to be made regarding the detailing at the interface of such cables where they may enter buildings.

A cable's fire safety performance regarding CPR would always have to be considered, after careful risk assessment(s) have been undertaken.

Such risk assessment would have to consider typically:

- Type of building
- Type of inhabitants within the building
- Different usages of parts of the building
- Escape strategies employed
- Any requirements from third parties, such as licensing authorities, insurers, etc.
- Euro classes adopted by other design parties for other items, such as window frames, wall or ceiling linings, fixed furnishings, etc.
- Euro Classes adopted by specifiers for other cabling systems such as datacoms, CCTV, intruder alarms, etc

'Best practice' design would be that the highest level of safety would need to be considered for buildings with inhabitants, which for reasons of age or illness would take longest to evacuate in event of fire.
Similarly, high rise buildings, buildings with high fire risk or building with high occupancies, such as places of public gatherings, shopping centres and the like would also warrant higher levels of fire safety arising from the hazards of burning cables.

Conversely, a dwelling house - perhaps housing a single family - could almost certainly have more than one means of escape from fire, and therefore might be evacuated relatively quickly.

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In these latter situations, the use of cables of a high Euro Class (and proportionate cost) would clearly not substantially contribute to the overall fire safety strategy.

Common sense would also dictate that it will be pointless 'over specifying' a cable Euro Class, if cabling systems employed on other systems, or indeed other building materials within the building are not available or being provided for the project in this Euro Class category.

12.2 UK Building Regulations

At the time of writing, the UK Building Regulations, which set out mandatory requirements for construction, do not specifically set out any levels of fire behaviour for cables, but do however give guidance for classifications of building linings and how they behave during a fire.

In the absence at present of specific requirements relating to relevant cable performance, the guidance given relating to linings could arguably be a good benchmark to aim for, when considering cables.

Approved Document B (Fire Safety) – Volume 2 – 'Buildings other than dwellinghouses', in its Section 6.1, provides the following useful table in this respect:

Table 10 **Classification of linings**

Location	National class [1]	European class [1][3][4]
Small rooms [2] of area not more than: a. 4m² in residential accommodation b. 30m² in non-residential accommodation	3	D-s3, d2
Other rooms [2] (including garages)	1	C-s3, d2
Circulation spaces within dwellings		
Other circulation spaces, including the common areas of blocks of flats	0	B-s3, d2 [5]

Notes:

1. See paragraph B2.v.
2. For meaning of room, see definition in Appendix E.
3. The National classifications do not automatically equate with the equivalent classifications in the European column, therefore, products cannot typically assume a European class, unless they have been tested accordingly.
4. When a classification includes 's3, d2', this means that there is no limit set for smoke production and/or flaming droplets/particles.
5. Wallcoverings which conform to BS EN 15102:2007 *Decorative wallcoverings – roll and panel form products*, which achieve at least Class C-s3,d2 and are bonded to a Class A2-s3,d2 substrate will also be acceptable.

It is worthy of note, that whilst the Euro Classes outlined above, can be equated to the new cable classifications under CPR, namely **D_{CA}, C_{CA} & B_{CA}**, the sub classifications in each case of s3, d2 set no parameters for limitations of smoke production and /or flaming droplets. Similarly, there is no mention or requirement set regarding the emission of acid gases.

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12.3 BS7671:2008

The current edition of the UK wiring regulations, BS 7671: 2008 – Amd 3: 2015, under its section 422 – - in its regulation 422.2.1, states:

- **precautions where particular risks of fire exist**

"In conditions BD2, BD3 or BD4, wiring systems shall not encroach on escape routes unless the wiring in the wiring system is provided with sheaths or enclosures, provided by the cable management system itself or by other means.

Wiring systems encroaching on escape routes shall not be within arm's reach unless they are provided with protection against mechanical damage likely to occur during an evacuation.

Wiring systems in escape routes shall be as short as practicable.

Wiring systems shall be non-flame propagating. Compliance with this requirement is ensured through one or more of the following, as relevant:

1. *(i) Cable meeting the relevant part of the BS EN 60332-3 series*
2. *(ii) Non-flame propagating conduit systems meeting the requirements of BS EN 61386-1*
3. *(iii) Non-flame propagating cable trunking systems and cable ducting systems meeting the requirements of BS EN 50085 series*
4. *(iv) Cable tray systems and cable ladder systems classified as non-flame propagating according to BS EN 61537*
5. *(v) Powertrack systems meeting the requirements of BS EN 61534 series*

In conditions BD2, BD3 or BD4, wiring systems that are supplying safety circuits shall have a resistance to fire rating of either the time authorized by regulations for building elements or one hour in the absence of such a regulation.

Wiring within escape routes shall have a limited rate of smoke production. Cables meeting a minimum of 60% light transmittance in accordance with BS EN 61034-2 shall be selected."

It is worth noting that the requirements of the final paragraph of this regulation, are met by specifying cables to BS 7211:2012, within which its clause 16.6 requires the 60% minimum light transmittance requirement to be met.

It is this standard that defines the requirements of cables to be described as 'having low emission of smoke and corrosive gases when affected by fire' – colloquially known in the industry as 'LSF' – or 'low smoke and fume'.

As such, the term Euro Classes are not mentioned at all, and there are currently no requirements for cable fire behaviour properties in areas other than areas defined as where 'particular risks of fire exist'.

12.4 Proposed BS7671:2008 (IET Wiring Regulations – 18th Edition)

At the time of writing, it is known that a new version of BS 7671 is being drafted, to take effect from January 2019.

Should the new 18th edition of BS 7671 follow the technical alignment with CENELEC & IEC harmonised documents, (such as HD 60364-4-42:2011 + A1:2015) it is highly likely that CPR and cable Euro Classes

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will be recognised and some requirements set out.

Relevant CENELEC / IEC requirements in this respect, (**relating only to 'locations where particular risks of fire exist'**), already stipulate:

- **In relation to escape routes in such areas**

"Cables to have the relevant classification according to the system of Euro classes for Reaction to Fire.

In addition, cables shall have a limited rate of smoke production meeting a minimum of 60% light transmittance in accordance with BS EN 61034-2

For energy cables this may be provided by cables with a declared minimum classification ***D^{CA}-s2-d2-a2*** *to BS EN 13501-6, together with the minimum requirement of BS EN 61034-2."*

And for

- **Locations where risk of fire exists due to nature of processed or stored materials in such areas**

"A cable shall as a minimum, satisfy the test under fire conditions specified in BS EN 60332-1-2 meet the requirements of Euro Class ***E^{CA}*** *(minimum) of BS EN 13501-6 (formerly the recommended performance requirements of BS EN 60332-1-2)."*

As regards cabling in all other areas, '*cables complying with at least the requirements of Euro Class E^{CA} (minimum)*' is currently stipulated within CENELEC/IEC standards to which BS 7671 is aligned.

It may well be the case that other third parties, (such as insurers, relevant codes of practice, and the like) stipulate higher requirements be provided.

In such cases, the designer is to liaise with such parties and ensure that all known requirements are incorporated for all cable types in specific areas.

12.5 Other guidance

At present, the only other known UK guidance regarding choice of cable Euro Classes, is contained with BS 6701:2016 'Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance'.

Clause 5.1.3.1 of this new standard states:

"For new installations and the refurbishment or extension of existing installations within the external fire barrier of buildings and other structures, installation cables which are subject to the Construction Products Regulations shall, as a minimum, meet the requirements of ***Euro Class C^{CA} – s1b,d2,a2****, in accordance with BS EN 13501-6."*

Clearly, in the instance where such cables will be being specified, this requirement will effectively 'set the bar' quite high, with respect the perceived minimum Euro Class needed for all other relevant cables within the building.

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In other words, the benefits and compliance of having telecoms cables meeting ***Euro Class C^{CA} – s1b,d2,a2*** will be lost if other cables within the building are specified to lower Euro Classes!

This is something all designers will have to carefully consider.

Appendix A of this guide sets out a basic flow chart 'ready reckoner' that may be used to assist designers in considering the relevant factors that may influence cable Euro Class selection.

12.6 Where does traditional PVC cabling fit in?

It should also be borne in mind that there is no such thing as official unique classification for any product. CPR is about the way in which products are tested, classified and assessed, and how they are placed on the market. The manufacturer is obliged to make a DoP, of which classification is a key point.

In theory, there is nothing to stop say Manufacturer X declaring Euro Class E, and Manufacturer Y declaring Euro Class C for essentially the same product – providing of course they have evidence to support it.

It is known however that for the typical common BS 6004 (Table 4 and 5) PVC/PVC ('twin and earth') cable to the Cable Manufacturers' Association reference '6242Y', that its only reaction to fire requirement is to meet the so-called 'Bunsen Burner test' detailed in IEC (BSEN) 60332-1-2.

Meeting this test equates exactly to Euro Class **E_{CA}**, and it is expected that most manufacturers will declare this classification for this common cable. Users and specifiers should however ensure that this is the case, by checking labelling..

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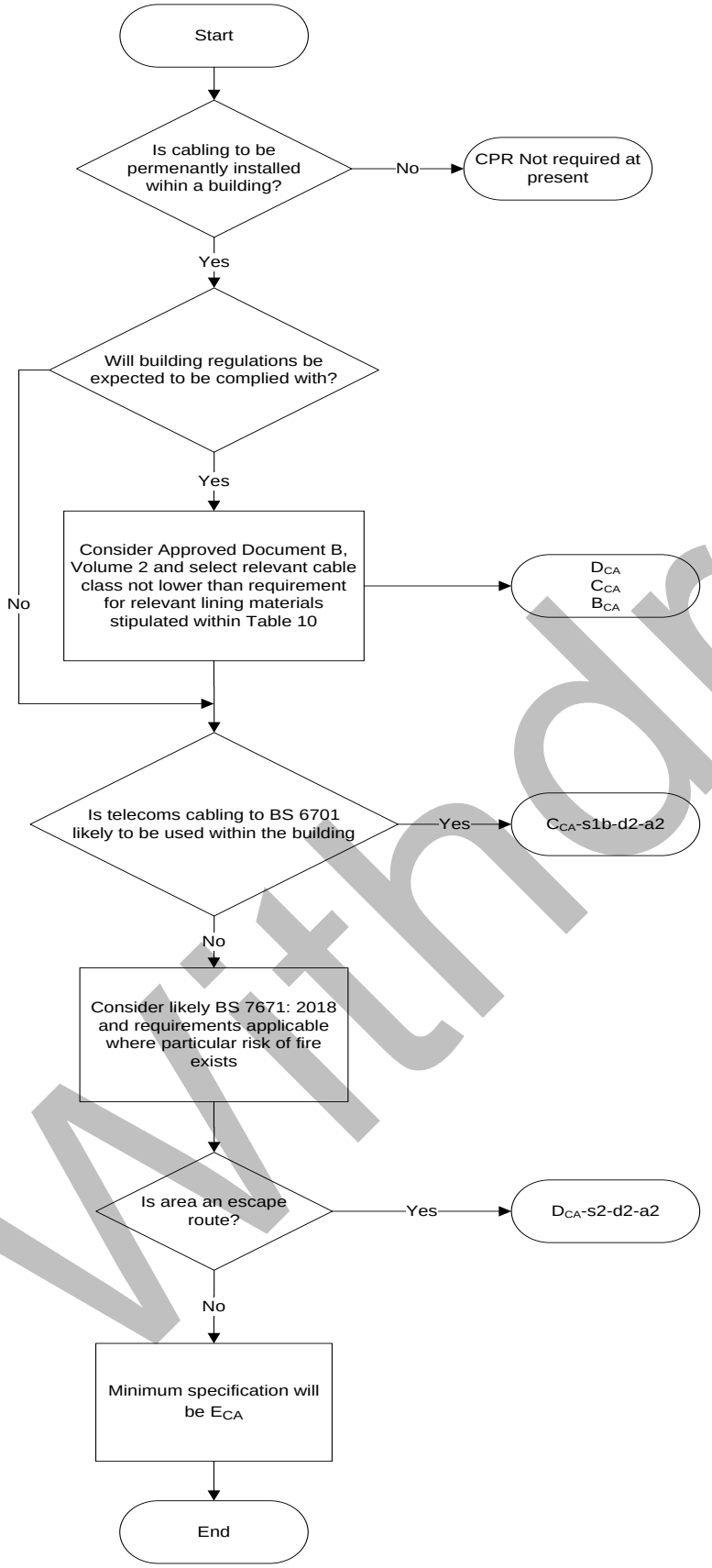
Appendix A: Cable Euro class 'ready reckoner' flow chart



NOTES

1.
This information is provided to give initial guidance only, to assist cable specifiers and designers, in considering some of the deciding factors which may dictate an appropriate cable Euro Class.

2.
Consideration should be given where a particular cable is to be routed through different locations within a building, that the minimum cable Euro Class is always met.

3.
Currently the requirements of CPR & cabling do not apply to cables needed to resist fire. Good practice however would be to select such cables so that they align with the Euro Class(es) needed for other cables in a building.

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Appendix B: Guidance given within other European countries

As detailed earlier in this document, at the time of writing it is known that guidance given on what classification to specify for a particular application, differs from country to country, depending on the local Building codes or legislation in place in that country.
The following summarises the stance taken thus far regarding CPR and cables, by the UK's near neighbours within Europe.

France	Minimum requirement is Class D^{CA}
Germany	Depends on building type. E.g. High-rise buildings are Class C^{CA}, with Class B^{CA} for fire escapes. Class E^{CA} only to be permitted for isolated buildings, with low usage and population *[1]
Sweden	Depends on whether fire suppression systems are in operation
Holland	Class D^{CA} is the minimum where cables are bunched, with Class $B2^{CA}$ and C^{CA} applicable if buildings have high population or difficult evacuation

*[1] more detailed information is available, based on the German Cable Makers' industry and are currently included in the revised version of the German national construction regulations relating to communications and energy installations. (DIN EN 50174 parts 1-3, VDE 0100-520 and VDE 0100-420)
These are replicated in the table in the following Appendix C.

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Appendix C: Cable classes in German National Construction Regulations

Building Classes according to the German model building regulation (Musterbauordnung)			Fire Classes	
Class	Description		Minimum Requirements	
			Building (except for escape routes)	Escape routes
1	Detached buildings or detached buildings for agricultural or forestry-related use	Up to 7m Not exceeding a total of 400m^2	E_{ca}	
2	Buildings	Up to 7m Not exceeding a total of 400m^2	E_{ca}	
3	Other buildings	Up to 7m	E_{ca}	$B2_{ca}$ s1 d1 a1
4	Other buildings	Up to 13m Up to 400m^2	E_{ca}	$B2_{ca}$ s1 d1 a1
5	Other buildings including underground buildings		C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
Special –purpose constructions				
S1	High-rise buildings	Exceeding 22m	C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S2	Construction work	Exceeding 30m	C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S3	Buildings	With the largest floor space of 1600m^2 except for residential buildings and garages	C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S4	Sales outlets	Exceeding 800m^2	C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S5	Office / Administration	Rooms exceeding 400m^2	C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S6	Buildings with single rooms	Single rooms can be used with more than 100 persons	C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S7	Places of assembly	More than 200 persons	C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S8	Restaurants / hotels	For more than 40 guests in buildings, more than 12 beds, casinos more than 150m^2	C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S9	Buildings with functional units provided for care or assistance dependent people	More than 6 persons, need for intensive care	$B2_{ca}$ s1 d1 a1	$B2_{ca}$ s1 d1 a1
S10	Hospitals		$B2_{ca}$ s1 d1 a1	$B2_{ca}$ s1 d1 a1
S11	Other facilities for accommodating people like residences		C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S12	Day-care facilities for children, disabled people and elderly		$B2_{ca}$ s1 d1 a1	$B2_{ca}$ s1 d1 a1
S13	Schools, universities or similar facilities		C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S14	Penal institution and construction works for psychiatric hospital treatments		C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S16	Leisure / amusement parks		C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
S18	Warehouse shelves with top of the load higher exceeding 7.5m		E_{ca}	$B2_{ca}$ s1 d1 a1
S19	Construction works for storage of substances with increased fire hazard		$B2_{ca}$ s1 d1 a1	$B2_{ca}$ s1 d1 a1
Further classification recommended by the German cable makers' industry				
	Industry		C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1
	Server rooms		$B2_{ca}$ s1 d1 a1	$B2_{ca}$ s1 d1 a1
	Road tunnels		$B2_{ca}$ s1 d1 a1	$B2_{ca}$ s1 d1 a1
	Rail tunnels		$B2_{ca}$ s1 d1 a1	$B2_{ca}$ s1 d1 a1
	Underground parking		C_{ca} s1 d2 a1	$B2_{ca}$ s1 d1 a1

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Appendix D: List of standards referred to

EN 50575: 2014	Power, control and communication cables. Cable for general applications in construction works subject to reaction to fire requirements
BS 7629-1:2015	Electric cables. Specification for 300/500V fire resistant, screened, fixed installation cables having low emission of smoke and corrosive gases when affected by fire. Multicore cables.
IEC 60332-1-2: 2004	Tests on electric and optical fibre cables under fire conditions. Test for vertical flame propagation for single insulated wire or cable.
BS EN 60332-3-24: 2009	Tests on electric and optical fibre cables under fire conditions. Test for vertical flame spread of vertically-mounted bunched wires or cables.
BS EN 61034-2: 2005 & 2103	Measurement of smoke density of cables burning under defined conditions. Test procedures and requirements.
BS 7211: 2012	Electric cables – Thermosetting insulated and thermoplastic sheathed cables for voltages up to and including 450/750 V for electric power and lighting and having low emission of smoke and corrosive gases when affected by fire.
BS EN 13501-6: 2014	Fire classification of construction products and building elements. Classification using data from reaction to fire tests on electric cables.
BS 6701:2016	Telecommunications equipment and telecommunications cabling. Specification for installation, operation and maintenance'.

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For further information and assistance please visit www.eca.co.uk where members and associates can benefit from unrivalled technical support across a whole range of electrotechnical activities.

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