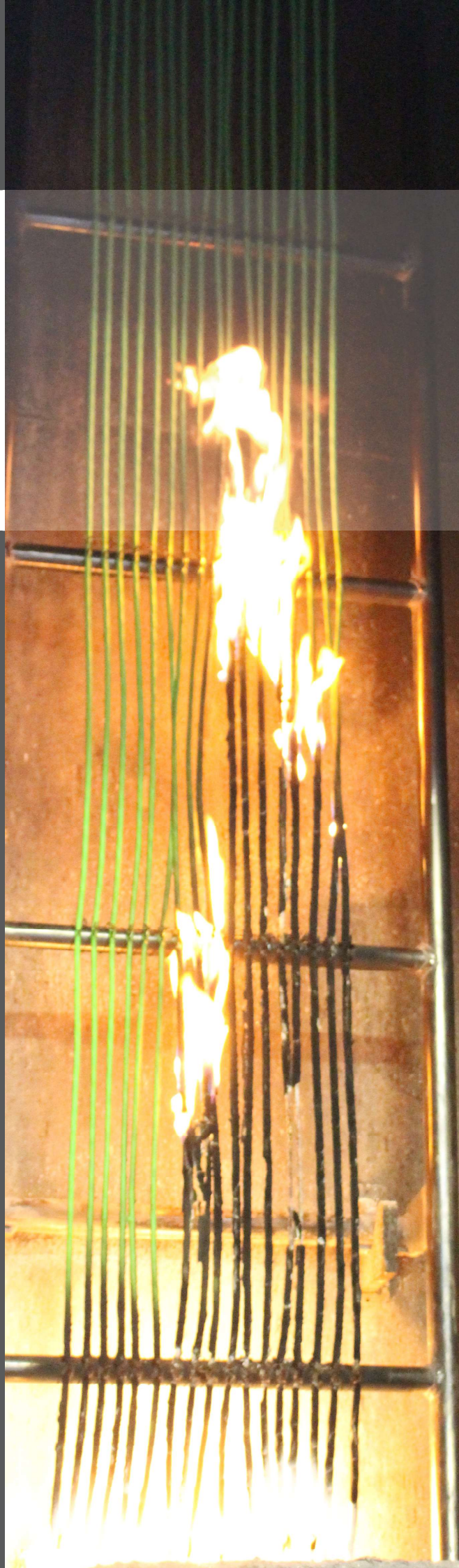
BASEC
BRITISH APPROVALS SERVICE FOR CABLES

CPR Classifications for cables

WORLDWIDE CABLE EXPERTS

Your quick reference guide to understanding CPR Classifications and cable testing, to meet the requirements for reaction to fire



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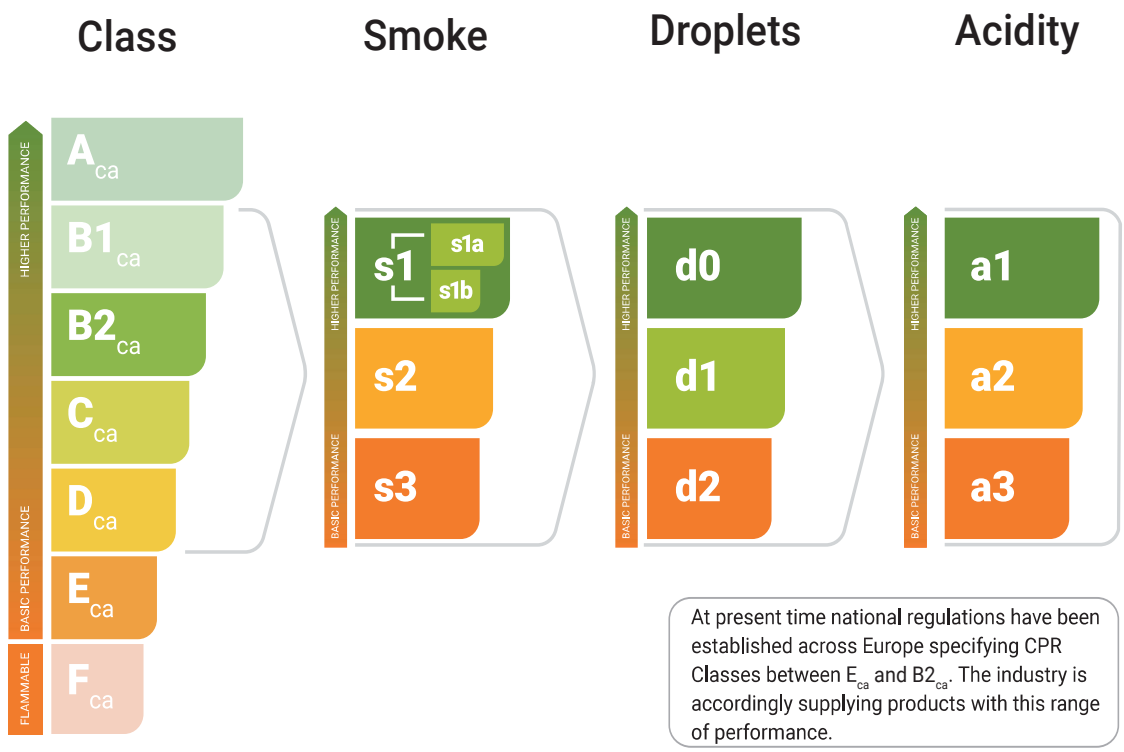
CPR Classification and Performance

The Construction Products Regulation, widely referred to as CPR, provides a harmonised set of rules for the classifying of all construction products. It was established in the European Union and UKCA marking now mirrors the EU framework for products destined for the UK market.

In accordance with the CPR fire testing standards and to evidence conformity in line with the UKCA and CE marking requirements, BASEC issues classification reporting to record and reflect the cable's classification which is comprised of the results of each test conducted.

- A seven class scale exists from Aca through to Fca to enable users and authorities to understand how cables respond if they were to be caught in fire scenarios.
- The classifications Aca – Fca are supported by Sub classifications for factors such as Smoke, Droplets and Acidity as shown on the following diagrams and tables, which are awarded subject to the performance of the cable.
- The additional classifications for Smoke, Droplets and Acidity apply to classifications B1ca to Dca, and the certification of reliable Eca classifications onwards must be conducted by a recognised Notified Body.
- Classification Fca is Self declared by the manufacturer



At present time national regulations have been established across Europe specifying CPR Classes between E_{ca} and $B2_{ca}$. The industry is accordingly supplying products with this range of performance.

Glossary of terms:

Please see below glossary of key terms used to determine fire testing results and inspections for CPR:

- **FS -** Flame Spread
- **HRR** - Heat Release Rate
- **THR** - Total Heat Release
- **FIGRA -** Fire Growth Rate
- **SPR -** Smoke Production Rate
- **TSP -** Total Smoke Production
- **PH -** Potential Hydrogen
- **FPC -** Factory Production Control

Primary Classification:

	FS	HRR	THR	FIGRA
B2ca	1.5	30	15	150
Cca	2	60	30	300
Dca	x	400	70	1300
Eca	x	x	x	x

The above table details the parameters required to achieve the relevant classifications for CPR from B2ca through to Dca, whereby the cable has to pass the Eca test initially being EN 60332-1-2 and qualify to undergo an EN50399 Ladder rig test.

The test to determine an Eca classified cable is less stringent and only involves a Bunsen Burner EN 60332-1-2.

To meet the requirements for the highest class B2ca, the flame spread must be below 1.5m during a Ladder rig test. The following performance must also be met, including Heat Release Rate, HHR below 30, Total Heat Release below 15 and FIGRA below 150.

Secondary Classification:

Table: Smoke Measurements

Ladder Rig Test

- Smoke production rate to achieve the highest sub classification s1 must be no more than 0.25 and total smoke production up to 50
- Once a s1 result is achieved for the 50399 Ladder rig test, the cable can progress onto the 3m Cube Smoke Emission Test EN (IEC) 61034-2 which measures light transmittance to detect smoke

	SPR	TSP
s1	0.25	50
s2	1.5	400

Table: Droplet

Ladder Rig Test

- During the 20 minute Ladder Rig test burn, flaming droplets are measured to provide a droplet class
- If there are no flaming droplets observed, the cable qualifies for the higest result of D0. If there are flaming droplets present lasting less than 10 seconds the cable qualifies for D1. If the droplets are longer than 10 seconds D2 is achieved

	Droplet	Seconds
d0	No	-
d1	Yes	<10 s
d2	Yes	>10 s

Table: Smoke Transmittance

3m Cube Emissions Test

- This test will enable a smoke classification of either s1a which will mean the cable has a light transmittance in the cube greater than 80 percent. If it falls below 80 percent, then a s1b classification will be given for smoke if it is greater than 60 and less than 80 percent

	Transmittance
s1a	>80
s1b	>60

Table: Acidity

- In relation to acid and gas testing EN (IEC) 60754-2 General method, all non metallic components in the cable will be tested that will be representative of the cable design. If the conductivity is less than 2.5 and the Ph levels are greater than 4.3 the cable will then qualify for an a1 result
- If any of these levels are greater than 2.5 and less than 4.3, the cable will move to the S2 class. For anything outside these parameters an a3 result is given.

	Conductivity	PH
a1	<2,5	>4,3
a2	<10	>4,3
a3	-	-

Assessment and Verification of Constancy of Performance (AVCP)

Overview

- The testing conducted on cable products to gain CPR varies depending on the classification sought. To ensure a consistent process is undertaken as part of the CPR framework, harmonised systems known as the Assessment and Verification of Constancy of Performance (AVCP) apply.
- Three systems apply specifically to cable products; **System 1+** in relation to classes Aca, B1ca and Cca, **System 3** for Dca and Eca and finally **System 4** for Fca.
- Product performance is then declared in the form of a Declaration of Performance document.

Categories Aca, B1ca, B2ca and Cca are subject to the requirement of AVCP System 1+

This requires the Approved/Notified certification body to undertake:

- Initial Audit inspection of plant and Factory Production Control, FPC
- Sample selection by a BASEC Representative at the customer facilities to record the batch number against the cable samples sent to the BASEC laboratory
- Initial CPR testing as detailed in the tables on the previous page, including EN 60332-1-2 Bunsen Burner and EN 50399 Ladder Rig, EN (IEC) 61034-2 Smoke, EN (IEC) 60754-2 General Method - Acid and Gas
- Surveillance, assessment and evaluation of factory production control, twice per year
- Annual testing of samples, 1 sample per construction

✔ Once testing is complete, a **Classification report** is issued to award the relevant classification achieved
✔ Once the FPC audit is complete, the Classification report can be issued with the **Certificate of Constancy of Performance**, which will demonstrate to the end user that the manufacturer is up to date with routine audits

The manufacturer undertakes:

- Internal FPC checks and annually tests one sample per construction / certificate per year to ensure it continues to comply to the results of the initial test. This is clarified within the two annual audits.

Categories Dea and Eca are subject to the requirement of AVCP System 3

- This tests the product once in its lifetime, it is not tested again unless the construction or materials of the product have changed.

CPR Classification According to Fire Performance

Reduced fire performance

Aca B1ca B2ca Cca Dca Eca Fca

System 1+	System 3	System 4
Notified Body Product Certification	Notified Test Laboratory	Manufacturer Testing

Processes to achieve and maintain System 1+, 3 and 4 explained

System 1+ (Aca, B1ca, B2ca and Cca

Manufacturers or suppliers are mandated to use an Independent Approved/Notified Body for all aspects of the CPR assessment, including: initial sample selection, inspection of plant and factory production control (FPC), initial type testing, issuing of classification reporting and certificate of constancy of performance (CoCP), surveillance, assessment and evaluation of production control twice per year and audit testing of samples.

Class	Process
Aca, B1ca, B2ca and Cca	1. Manufacturer engages Approved/Notified Body and supplies full product data 2. Approved/Notified Body undertakes factory production control (FPC) assessment, sample selection and testing. 3. Classification report is issued by the Approved/Notified Body followed by a certificate of constancy of performance (CoCP). 4. Manufacturer creates Declaration of performance (DoP) and applies UKCA or CE marking to cable 5. On-going and annual FPC assessment of manufacturer, Approved/Notified Body surveillance and triennial testing

System 3 (Dca and Eca)

Manufacturers or suppliers are required to use an Approved/Notified Body for initial type testing and issuing of the classification report.

Class	Process
Dca and Eca	1. Manufacturer engages Approved/Notified Body and supplies full product data 2. Manufacturer selects samples and sends to Approved/Notified Body test laboratory 3. Notified body undertakes testing and issues Classification report 4. Manufacturer creates DoP and applies UKCA or CE marking to cable 5. On-going manufacturers FPC assessment, no further Approved/Notified Body testing unless product changes

System 4 (Fca)

Manufacturers and suppliers conduct their own tests and self-certify classifications to Fca.

Class	Process
Fca	1. Manufacturer selects sample 2. Manufacturer or Approved/Notified Body tests sample 3. Manufacturer creates DoP and applies UKCA or CE marking to cable 4. On-going manufacturers FPC

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