



VDE

Testing of Cables and Cords within the scope of the Construction Products Regulation (CPR)

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Testing of Cables and Cords within the scope of CPR

- Procedure to get ready for CPR

- 1) Relevance of CPR

Power, control and communication cables are covered by CPR

Construction product: incorporated in a permanent manner in construction works

Construction drawing and material

- 2) Desired fire class

Which fire class should be reached by a cable?

Procedure to get ready for CPR

- 3) Additional classification

Beside the fire class, additional (optional) classifications are possible:

- Smoke production s1, s2, s3
 - Analyzed during EN 50399 fire test
 - Additionally: s1a, s1b
 - s1 + test according to EN 61034-2
- Acidity a1, a2, a3
 - Test according to EN 50267-2-3 / EN 60754-2
- Flaming droplets / particles d0, d1, d2
 - Analyzed during EN50399 fire test

Procedure to get ready for CPR

- 4) Notified Body / test location
- Selection of a Notified Body (NB) as partner for CPR, for example, VDE.

- 5) First orienting fire tests
- *Heat Release* fire test procedure of EN 50399 is still in some way new and may give unexpected results at the very beginning.
- Maybe a few orienting fire tests help to set up the final product / testing strategy.

- 6) Completing necessary fire tests

Procedure to get ready for CPR

- 7) Initial Inspection
- Only for AVCP system 1+
- Inspection of
 - • factory
 - • factory production control
- Very close to common initial inspections, like for the VDE mark

Procedure to get ready for CPR

- 8) Paperwork
 - Notified Body:
 - Test report
 - Classification report as described in EN 13501-6
 - For AVCP system 1+: certificate

 - Manufacturer
 - Declaration of Performance
 - CE-Label
 - Internal documentation
 - Marketing documents,...

Introduction to CPR

- EU Regulation 305/2011: Construction Products Regulation (CPR)
- Goal: ensuring an effective and efficient EC domestic market by definition of performance
- requirements for construction products
- Effective since April 2011
- Replaced finally the CPD (Construction Products directive) in July 2013

**REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 9 March 2011
laying down harmonised conditions for the marketing of construction products and repealing
Council Directive 89/106/EEC**

Introduction to CPR

Which products are concerned?

- According to CPR, construction products may be placed on the market only if they are made in such a way that – considering proper planning and construction work – they meet specific requirements

- Construction Product

Any product or kit...for incorporation in a permanent manner in construction works...and the performance of which has an effect on the performance of the construction works with respect to the basic requirements for construction works.

- Construction Works

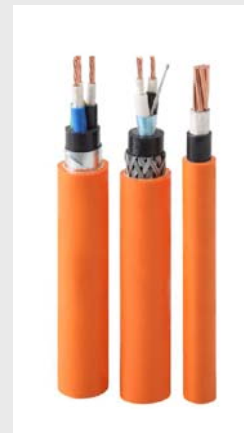
Buildings and civil engineering work.

Introduction to CPR

- Which products are concerned?

Power, control and communication cables are explicitly mentioned in the CPR, unlike the previous CPD.

Therefore, cables installed (permanently) in construction products are affected by the CPR



Introduction to CPR

- Which requirements are set?

According to CPR, construction products may be placed on the market only if they are made in such a way that – considering proper planning and construction work – they meet specific requirements

- The requirements cover the following areas (essential characteristics):
 - Mechanical resistance and stability
 - Safety in case of fire
 - Hygiene, health and the environment
 - Safety and accessibility in use
 - Protection against noise
 - Energy economy and heat retention
 - Sustainable use of natural resources

Declaration of Performance

- Obligations for manufacturers regarding CPR
- Prime obligation:
providing a DoP = Declaration of Performance for the product

- The DoP describes the performance of the product
 - ...concerning the essential characteristics
 - ...according to the applicable harmonized technical specifications

Declaration of Performance

- CE Labeling



CE marking, consisting of the "CE"-symbol

Identification number of the product certification body

Name and the registered address of the manufacturer, or identifying mark

Last two digits of the year in which the marking was first affixed

Reference number of the DoP

No. of European Standard applied, as referenced in OJEU

Unique identification code of the product-type

Intended use of the product as laid down in the European Standard applied

Class of performance

Declaration of Performance

- Reaction to fire
- Decision EU 2006/751 defines the following Fire Classes for cables
A_{Ca} B1_{Ca} B2_{Ca} C_{Ca} D_{Ca} E_{Ca}
- EN 50575: *Power, control and communication cables - Cables for general applications in construction works subject to reaction to fire requirements*
 - Describes the process of conformity assessment
 - Describes requirements on internal production assessment / self testing
 - Assigns each fire class with the appropriate test standards
 - Standard was published by Cenelec in 09/2014 and published in the Official Journal in 07/2015

Declaration of Performance

- Reaction to fire (continued)
- EN 13501-6: *Fire classification of construction products and building elements - Part 6: Classification using data from reaction to fire tests on electric cables*
 - Describes the required results for the different tests to obtain a certain fire class.

How does the conformity assessment of products work?

Conformity assessment is done according to one of the *Systems of Assessment and Verification of Constancy of Performance* described in Annex V of CPR.

- Five different systems are described.
- For cables, in EN 50575 is described, which system has to be applied for which fire class.
- Four out of five systems call for involvement of a Notified Body.

Fire Tests

- Testing standards:
 - EN 50399
 - EN 60332-1-2
 - EN 61034-2
 - EN 50267-2-3

Fire Tests

- EN 50399
- Common test methods for cables under fire conditions - *Heat release and smoke production measurement on cables during flame spread test - Test apparatus, procedures, results*
- General test procedure
- Several cable samples, fixed side by side on a cable ladder, are exposed to fire in a fire chamber
- The developing exhaust gases are analyzed regarding temperature and oxygen / carbon dioxide content, which gives information about the heat release
- A light beam in the exhaust pipe gives information about the smoke density
- The occurrence of flaming droplets is checked during the flame impingement
- Fire test with 20.5 kW or 30.0 kW power
- Flame impingement: 20 minutes

Fire Tests

- EN 60332-1-2
- *Tests on electric and optical fibre cables under fire conditions –*
- *Part 1-2: Test for vertical flame propagation for a single insulated wire or cable –*
- *Procedure for 1 kW pre-mixed flame*
- General test procedure
- A cable sample (length 60cm) is fixed in a draught-free chamber.
- A burner with a 1 kW-flame is applied to the sample at an angle of 45°
- Flame impingement: 1-8 minutes, depending on cable diameter
- Measuring parameter:
 - H: charring length

Fire Tests

- EN 61034-2
- *Measurement of smoke density of cables burning under defined conditions –*
- *Part 2: Test procedure and requirements*
- General test procedure
- Cable samples (length 100cm) are fixed in a special 3x3x3 m³ cube-type chamber above a fire bowl with burning alcohol
- A light source is fixed on one side of the chamber
- On the opposite side, the light intensity is measured
- Measuring parameter:
 - Reduction of light intensity [in %], caused by developing smoke in the chamber

Fire Tests

- EN 50267-2-3
- *Common test methods for cables under fire conditions –*
- *Tests on gases evolved during combustion of materials from cables –*
- *Part 2-3: Procedures – Determination of degree of acidity of gases for cables by determination of the weighted average of pH and conductivity*
- General test procedure
- One gram of the cable material to be tested is put in a furnace at $\geq 935^{\circ} \text{C}$
- The developing exhaust gases are washed
- The liquid is analyzed concerning conductivity and pH value
- Measuring parameter:
 - Conductivity
 - pH value