Products Construction Regulation: do HVAC and DC cable have to answer?

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ABSTRACT

This paper describes how fire safety technologies and new regulation are affecting High Voltage (HV) cables links. After an overview of consequences on HV installation of European regulation and especially Construction Products Regulation (CPR), and through a series of experiences done on HV cables, we will propose some technical solution to address TSO's new needs and specifications.

Since July 2017 all energy cables located in a construction works and infrastructure works for permanent usage in France must comply with CPR. Therefore TSO have to wonder when HV cables must have an improved fire reaction performance, in accordance with the European regulation and the local rules. Depending on the required safety level HV cables manufacturers should provide cables with the right fire reaction level.

KEYWORDS

CPR, Euroclasses, HVAC cables, HVDC cables, test methods, reaction to fire

NEW FIRE REGULATION AND HV CABLE SYSTEMS

Since about 20 years, fire propagation inside construction works welcoming public crowds and professional staffs have been becoming a predominant concern for whole stakeholders, operators as well as their partners and suppliers.

French cable manufacturers benefit from quite a long experience in designing cable taking into consideration the fire risk and how suitable cable designs mitigates the consequences of a fire in terms of propagation, dense smoke production, corrosive and toxic gas emission. Indeed this started in the eighties with railway operators, particularly with Parisian subway operator (RATP) already concerned by safety of people in stations as well as technicians working for maintenance, upgrading of existing equipment as well as installation of new assets. These first developments were dealing more with LV, MV, Telecommunication cables (copper and later optical fibres ones). Then came during second half of the eighties developments of cables to fit in the tunnel under the channel, deployment of cables on board of ships, in airports…

During second half of the nineties, it was agreed at European level that there was a need for a legal frame relating to safety risks in works receiving public. It took up to 2011 to see the first version of Construction Product Rule issued by the European Commission. Then, once the legal frame made available, standards were progressively completed such as:

- EN 13501-6 listing the different classes to fires, so-called Euroclasses [1]
- Standards providing with harmonized test methods among which EN 50399 [2], EN 61034-2, EN 60332-1-2, EN 60754-2
- EN 50575 [3] relating to measures to be taken to apply CPR to cable designs
- TS 50576 [4] stating how a test result extends the qualification to a range of products

According to the risk associated with the location of cables links it has to be decided which Euroclass conditions the cable has to be compliant with. The parameters to be mastered in this respect are Fire Growth Rate Index (FIGRA), Peak of Heat Release Rate (PHRR), Total Heat Release (THR), Fire Spread (FS) and Flame Spread (H). These tests enable to select the main Euroclass. Additional criteria may be considered to fine tune according to the required level of safety by prescribers in application of CPR: smoke density, droplets and gas acidity.

Immediately impact on LV/MV and telecommunication cables was clearly identified. Then the question came on how are impacted HC AC or DC cable systems. Even if HV cable links are not present in works welcoming crowds, it appears that, in many cases, HV cable links are deployed in tunnels, technical galleries, shafts and, on quite short distances in substation works. Most of the time these infrastructures are visit able and, consequently, CPR applies.

In next part of this article, we will come back on some experiences on projects showing that improving cable behaviour into a fire is a must and how it impacts the design of cable system.