Quality Assurance and Quality Control in Cable Systems

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ABSTRACT

Quality Assurance (QA) and Quality Control (QC) in Cable System Projects are key elements to maintain proper electric grid stability and quality of electric supply.

This paper provides an approach towards defining the proper level of quality for a given technology or for a specific project. Some examples of QA and QC are provided. They can be implemented at different stages of a project lifetime and explanations on how they benefit to the project's outcome are given.

Finally, the rising amount of controls leads to the development of major frame contracts for sub-contracting of inspection services. A proposal to address this topic is given in the article.

KEYWORDS

Quality Control; Quality Assurance; Maintenance, Compliance Testing, Routine & Sample Tests; Cable System.

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INTRODUCTION

With the rising share of insulated cable systems within the electric network, either onshore or offshore, AC or DC, the reliability of such system has (and will) become, more than ever, a keystone in the network's stability and quality of electric supply. Not only are defaults in cable system causing grid instability, they also come with a significant cost of repair and losses of revenue induced by unavailability of the link.

In that regard, quality assurances and quality controls should be put in place at all the stages of a cable project, to guarantee that the installed and operated cable system will be fit for its purpose, or, in other words, meet its expected design lifetime with minimum cost of repair and losses for revenue.

Although several definitions exist, Quality Assurance is often defined as the way to ensure that the correct organization has been set up in order to avoid defect at a later stage and in order to reach desired performances of the product/project. It focuses on administrative and protocol activities, ensuring they exist and are adapted to the project and/or the product's specification. Quality Control on the other hand ensures that the operation or the product manufactured meets the expected performances. It comes into various forms one of them being testing.

In this article, an approach towards defining the proper level of quality for a dedicated technology or for a specific project is given. Practical examples are presented for different stages of cable project lifetime, both for quality assurance and quality control.

Finally, with the rising number of projects, a larger share of QA/QC activities may need to be subcontracted, ranging from qualification assessment to factory testing and installation follow-up. This can lead to the creation of major frame market contracts for inspection services. A proposal of how to address this topic is given in chap.VII.

I. DEFINING QUALITY LEVELS

Prior to establishing quality plans, the proper level of quality should be carefully analyzed and evaluated. Quality requirements may not be the same from one project to another.

For that purpose, it may be relevant to set up and internal evaluation process, allowing to define the overall needed quality of a project. As further expressed in the article, the evaluation process mostly impacts the quality controls, but may have an influence on the quality assurances processes as well.

The proposed evaluation is based on three steps: First, analyzing the criticality of the project itself, then the maturity of the technology and finally, combining the previous two, evaluating the overall quality level of the project.

1. Evaluating Criticality of a Project

To evaluate criticality of a project a basic scale as per illustrated within the Figure 1 below could be implemented. Precisely setting up of the criteria to define the grades of the scale could be left to the organisation's appreciation, depending on its own constraints and specificities. However, the following aspects can be taken into consideration: the consequences for the electrical network stability in case of failure of the future project, the complexity of the works to be implemented, the allotment strategy of the project and the associated amount of risks for the Client, the number of subcontractors that may be involved in the project, the planning constraints etc.
Compared to the distribution network, transmission lines connecting large production or consumption sites or designed to transport large power flows tend to act as backbones for the grid. For these assets, a failure could impact numerous stakeholders.