Green Installation and Method for Manufacturing Hyper Clean XLPE AC/DC Compounds.

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ABSTRACT

The manufacturing conditions to produce insulation parts for power cables require that the peroxide should be added after compounding filtration. This principle implies that traditional production plants are always based on a batch peroxide soaking process, with controlled heating, cooling and residence time sequences. This "soaking" or "impregnation process" is always conducted in an enclosed soaking tower, the height of which is usually around 50 m. The present paper is to propose a new installation for manufacturing hyper-clean cross-linkable polyethylene compound without drawbacks known in the art. In particular, a facility which does not need a soaking tower.

KEYWORDS

Soaking Tower – XLPE – EHV AC DC - Process – Peroxide – Antioxidant – Cleanliness – Carbon Footprint – Green – Post Extrusion Peroxide Addition – Hyperclean – LSHC – Compound Evaluation.

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INTRODUCTION

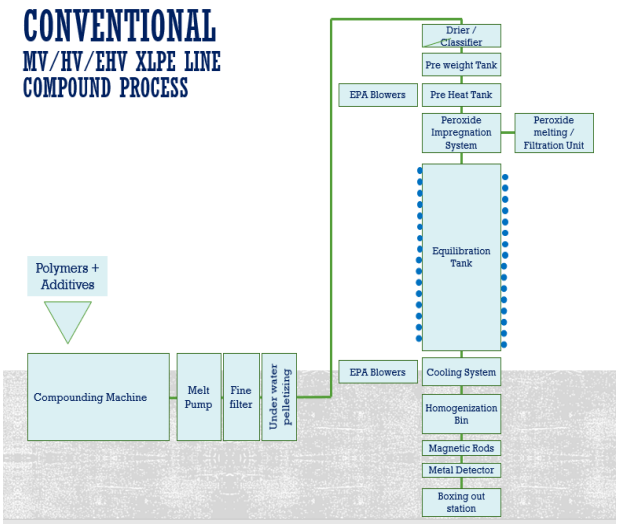
This document describes a new process for producing Medium, High and Extra High voltage AC/DC XLPE compounds.
The benefit of such an installation contributes to a "green philosophy" as the concept requires much less energy. The final product is even cleaner than those produced in traditional plants.

This paper describes this novel process as well as the evaluation of an EHV XLPE compound produced from the very same process.
Environmentally speaking, the search for products whose contents and methods of production have the smallest possible impact on the environment, is of paramount importance.

TRADITIONAL XLPE PRODUCTION UNIT

The existing plants originate at the beginning of the sixties [1] and since then, they have been gradually optimized to produce consistent and reliable compounds, known worldwide as XLPE (Crosslinked Polyethylene). XLPE applications span over a wide range of voltages from 6/10 kV to 500 kV and beyond. However, the concept remains the same, continuous compounding where different polymers are mixed along with additives such as antioxidants, scorch retarder, crosslinking enhancer, etc followed by a batch peroxide soaking process with controlled heating cooling and residence time sequences. Ideally, the soaking is conducted in an enclosed soaking tower (up to 50 m. high) where from polymer pre-weighing to the packaging of the finished product the chain of operations is conducted cascading down by gravity. Both, the continuous and the batch process are preferably harmonized to produce a regular output. Fig 1: conventional XLPE line schematic drawing.

Figure 1: The 60 years old conventional process



Here, polymers and additives respectively mean LDPE, copolymers, EPR, EPDM, and combinations thereof, if special MV applications are considered. Additives mean antioxidant packages, plus optionally voltage stabilizers, crosslinking booster, scorch retarders etc.

The new green process, See Fig 2 is defined as LSHC XLPE (Linear Short Hyperclean) [2]. It is the same as the conventional XLPE compounding line except that two types of equipment have been inserted, one after the filter and one, right before packaging.

Figure 2: The New Green Process