

Development of the Super-capacity insulated wire cable for distribution line.

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ABSTRACT

The new XLPE insulating materials has superior thermal and mechanical properties than the conventional XLPE .

This new material based on MDPE (Medium Density Polyethylene) and LLDPE (Linear Low Density Polyethylene), it can be improved to thermal resistance property by adjusting to MV, HV cable without changing existing structure and newly installing the process line

In this paper, we deal with developing the new XLPE insulated super-capacity wire cable that can increase temperature in normal operating condition of distribution cable to be more concrete from 90□ to above 120□.

KEYWORDS

New Thermal insulated material, MDPE, LLDPE, Special additives, Super capacity, distribution line

1. Introduction

As development of industrial society continues to increase, the metropolis becomes to need more electric power. To meet recent increasing demands for electric power in metropolis, we should expand a distribution line.

But it can be expensive to charge the cost of expansion work. It also doesn't make a good appearance when the distribution cable is installed in the metropolis.

We will show the solution for above phenomena by enhancing of the maximum conductor temperature in normal operated condition of distribution cable from 90□ to above 120□.

The XLPE has been widely used to insulate the CV cable because its high thermal stability might be originated from cross-linking structure. However, it has restriction on the operating temperature up to 90□. The XLPE insulation has properties that rapidly fall if it is continuing above 120□ for a long time,

The new XLPE has the excellent thermal-resistance properties and equals or superiors mechanical properties compared to the conventional XLPE.

Therefore, it can transmit more current because thermo-stability of insulation is improved even though the structure of cable is same.

The illustrated in Fig.1 show a solution for above described problems.



Fig 1. Super-capacity insulated wire cable

2. Development of super-capacity wire cable

2.1 Development of insulating materials

Basically, there is a difference between XLPE and new-XLPE in the base material.

The traditional distribution cable is usually consist of LDPE as base component and additives like DCP or silane for cross-linking, Anti-oxidant agent, UV-stabilizer, Cross-linking agent, carbon black, etc.

On the other hand, the New XLPE insulated distribution cable is consist of the mixture of MDPE(Medium Density Polyethylene) and LLDPE(Linear Low Density Polyethylene) with special additives, Anti-oxidant agent, UV-stabilizer, Cross-linking agent, carbon black, etc. for increasing thermal resistance.

MDPE has alpha olefin in the main chain of polyethylene. This alpha olefin increases the efficiency of tie molecules that link crystal and amorphous region resulting to the enhancement of long-term thermal and electrical properties. However, it was difficult to extrude as cable insulation material.

For that reason, MDPE was not used for material of cable in spite of these good properties.

In order to solve this problem we mix the LLDPE to the existing MDPE base.

And also it is used special additives for preventing cross-linking in early stage like scorch phenomena.

The amount of additives except carbon black is important