15 YEAR EXPERIENCE OF COLD-SHRINKABLE MEDIUM VOLTAGE JOINTS

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ABSTRACT

The MV JOINTS using Cold Shrink (CS) were introduced on the market for over 15 years, reaching more than several million units in service all over the world. It is now possible to take stock of their use, their various cases of application but also the last performance of this technology to meet customer new requirements

This article presents:

A brief history of development of this technology from the origin and state of the art to date;

Acquired experience, flexibility, adaptability and reliability that can meet different user requirements,

The key parameters that must imperatively be implemented to ensure the success of this technology such as high performance materials, electrical and thermal parameters, the resistance to moisture, and other specific characteristics to meet specific applications. The tests necessary to validate these parameters will be also be presented

The integration of the related technology of mechanical connectors, perfectly complementary in implementation and simplification of tooling and product lines;

The new requirements (development of renewable energy…) that this still promising technique will still satisfy in the near future.

KEYWORDS

Joints - Cold-shrinkable - EPR.

INTRODUCTION

The cold shrink joints have been developed here over 20 years and started to be installed on the network that is more than 17 years. Construction of these junctions as well as some changes have already been described previously [1] [2].

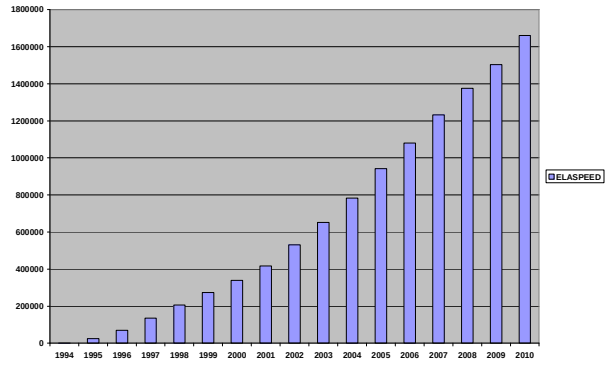

Fig. 1: Cumulative annual quantities

These joints are designed to original components from extruded EPDM polymer. The original idea was to create a junction "like a cable". The development of this technology was very important, many users have been seduced by the performance and ease of installation. And more than one million units in service worldwide in environmental conditions and multiple voltage classes up to 41.5kV class (Fig. 1).

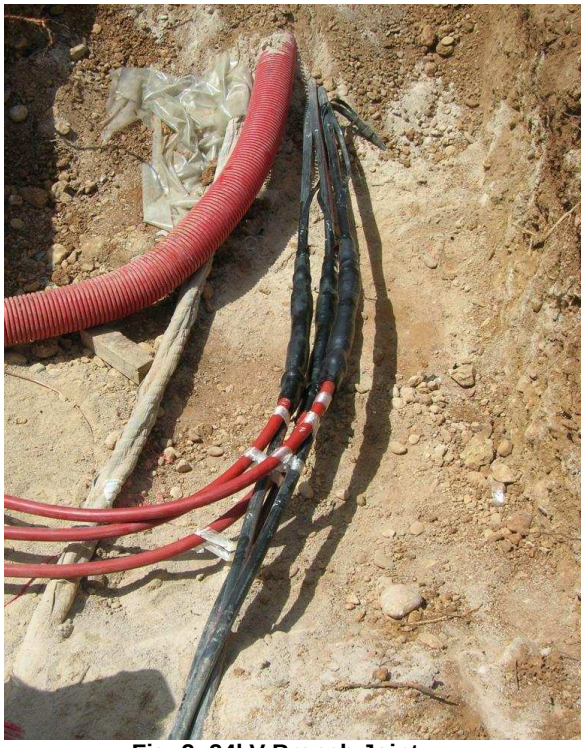

Fig. 2: 24kV Branch Joint

RELIABILITY OF COLD-SHRINK JOINTS

Apart from the requirements demanded by national and international standards, it has demonstrated its ability to adapt and respond to requests for special environments which are faced by certain customers.

Electrical Performances

The operating temperature of medium voltage cables is limited by the nature of their insulation. In the case of XLPE insulated cables, the maximum operating temperature is set at 90℃, those EPR at 105℃. In so me cases, overloading may occur at 120℃ or 130℃. New cable insulation can also now reach 130℃ in servic e. Also, in parallel, the dimension of cables has been optimized in some cases with a gradient on the insulator surface at the screen, which rose from 2.0 kV / mm to 2.5 kV/mm. Qualification tests of medium voltage joints features types and number of thermal cycles different from one standard to another (IEEE 404 [3], IEC60502-4 [4], HD629S2 Part 1 & 2 [5], etc ...).

During the different phases of development and adaptation, the joint has been tested in various configurations depending on the following test sequence:

- Number of cycles: 210 cycles;
- Cycle Profile: 5h heating with at least 2h at steady temperature, 3h of natural cooling;