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Development of cold shrinkable joints for 110~230 kV XLPE cable
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Abstract: Cold shrinkable joints of one piece type consisted of silicone or ethylenepropylene rubber are being rapidly used widely in Japan and abroad, and it is extending to the extra high voltage classes because of its compact and skill-free merit. We have developed the 110 kV~230kV cold shrinkable joints using the pre-expanded rubber block made of high performance silicone rubber.

Keywords: Silicone rubber, Cold shrinkable, Pre-expanded, skill-free

1. Introduction

Tape-wrapped joints (TJs) have been mostly used for the 66/77kV XLPE cable systems over 30 years in Japan after its development. However, TJs require the certain jointing skills, times for assembly, and the special tools. Cold shrinkable joints of one piece type consisted of silicone or ethylene-propylene rubber are being rapidly used widely in Japan and abroad, and it is extending to the extra high voltage class because of its compact and skill-free merit.

Here, three types of premoulded one-piece type joint have been already developed [1] [2] [3] [4]. One is the type of pre-expanded rubber mould in the factory, which can easily assembly by pulling out spiral core at the site. Another one is the type of rubber mould joints which assembly after expansion at the site. The last one is , the direct insertion type to the cable insulator.

Pre-expanded rubber mould joint have the great merit which shortens the assembly time without the special tools only by pulling out the spiral core compared with the another type joints. And ,it is more compact than the conventional TJs.

We have developed the two kinds of cold shrinkable joints covering 110 kV~230kV rated class(for 110 kV and 132kV, for 161kV and 230kV), using the pre-

Résumé: Les joints rétractables à froid en une pièce en caoutchouc silicone ou en caoutchouc d'éthylène propylène commencent à répandre rapidement dans les divers pays du monde, et leur application est en train d'être élargie aux câbles des classes à extrême haute tension par leur compacité et leur facilité d'utilisation qui ne nécessite pas de compétence particulière (skill-free). Nous avons mis au point les joints rétractables à froid 110-230kV en caoutchouc silicone de haute performance pré-élargie à l'usine.

Mots-clé:Caoutchouc silicone, rétractable à froid, pré-élargie, skill-free

expanded rubber block made of excellent thermal and physical performance silicone rubber. The initial characteristics were confirmed based on JEC3408, IEC60840, IEC62067. Long-term reliability was confirmed in the 6-months long-term verification test based on JEC3408 for rated 110/132kV joints. For rated 161/230kV joints,12-months pre-qualification test is progressing based on IEC62067.

2. Structures and Features

We have developed the two kinds of rubber block. One is for 110/132kV XLPE cables, One is for 161/230kV XLPE cables. Rubber block consists of shielding electrode, insulation parts and stress relief cone and semi-conductive outer shielding layer made of high performance silicone rubber. That is the cold shrinkable type of one-piece structure. The block type which we have adopted is pre-expanded type by the spiral core in the factory because of its skill-free merit. Fig.1 shows the rubber block before and after expansion by spiral core for the 110/132kV XLPE cables. Fig.3 shows for the 161/230kV. Fig.2 and Fig.4 respectively shows the structures of cold shrinkable joint for 110/132kV and 132/161kV XLPE cable. We have achieved the compact structure compared with the conventional joints such as TJs .